Modeling a dragon with NURBS in Maya:

This piece of article will show you step by step of how the dragon is created using Maya. There are three type of modeling method in Maya, NURBS modeling, Subdivision modeling and Polygon modeling, each of them have their advantages and disadvantages. However we will build the dragon using patch NURBS surface techniques. The tools that I use to model this dragon are Birail tools, NURBS primitive, Fillet Blend Tools and etc.

In the first section, I will show you how the dragon is created by using Maya. Next section, texturing the dragon will be shown. We need to paint the texture and create bump map in PhotoShop, but before that, I will need Deep Paint 3D to create reference line on how the texture will be distorted by NURBS. The detail will be covered in the texturing section.

Before I start launching Maya, I will do some concept sketching on paper. This is important, as it will be easier for me to visualise the object I have in mind later on. I wanted to create a dragon between realistic and imaginative. I want it to look like a T-Rex but with horn and larger

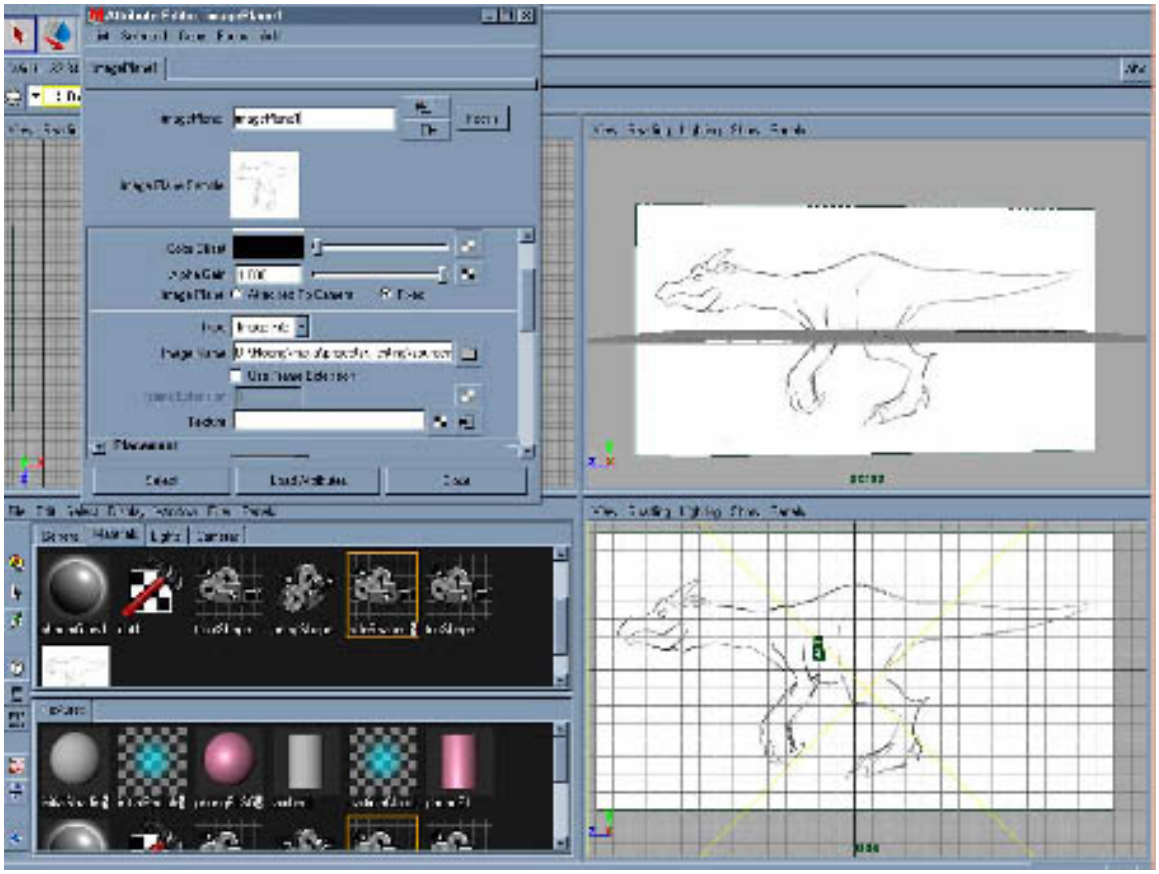
forelimbs. Only the side orthographic is needed to create the model. When I have done, I will scan in the sketch and save it as JPEG. (Figure 1)

(Figure 1)

Creating Image Planes

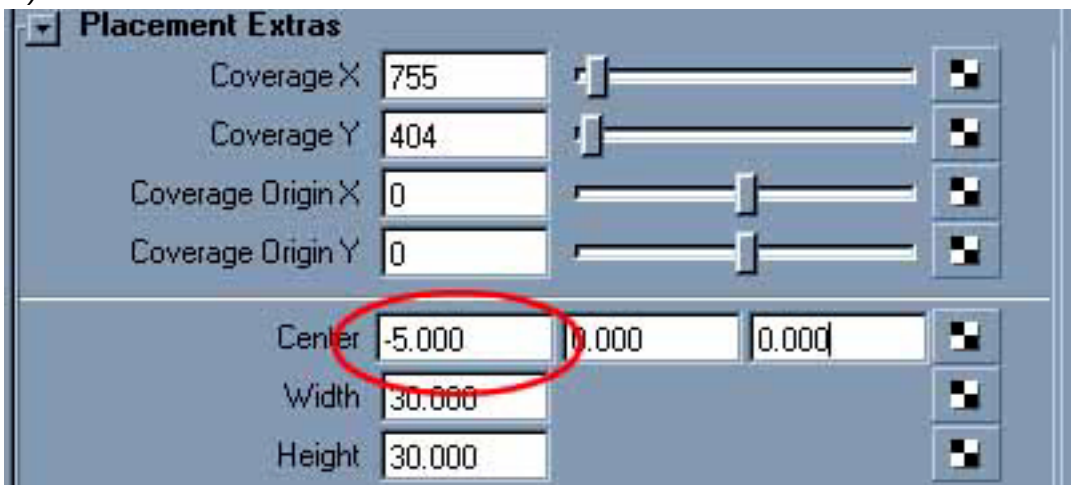
1.Select Multilister from Window menu, from camera tab double click side camera or Ctrl-a to open Attributes Editor. Scroll down the list of entries until you see Environment pop-up menu. Click on the Create Image Plane button.

2.In Image Name option, click Browse and load the JPEG file as reference for modeling. (Figure 2)



(Figure 2)

3.Now, I will translate the image plane further away from axis X origin, so as to avoid any intersection with my model. From image Plane, Attribute, scroll down to Placement Extras. Key in -5 in the first input field. (Figure 3)

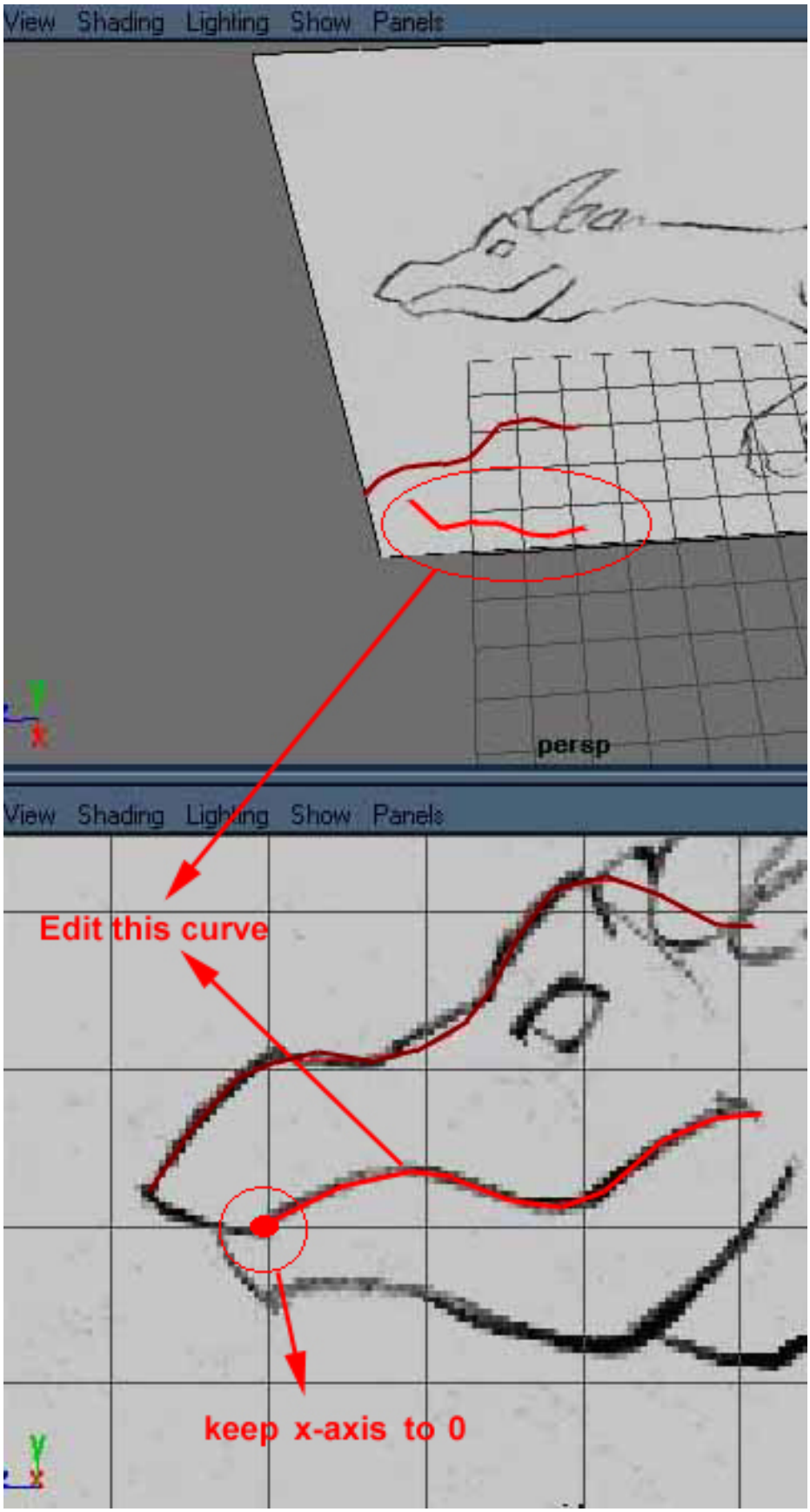


(Figure 3)

Modeling the Head

1.Go to Create, EP Curve Tool. Note that curve created by EP Curve Tool will pass through every point you draw. Press Enter to confirm when done.

2.In side view window, draw 2 separate curve as shown. Select second curve, press F8 to switch to Components selection mode if it is in Objects selection mode. Hold down RMB to invoke hotbox and select Edit point. After select curve's Edit Point, press w to activate move tool then pulls points along X-axis. Remember not to edit the first point near the nose. (Figure 4)


View Shading Lighting Show Panels
persp
View Shading Lighting Show Panels
Edit this curve
keep x-axis to 0

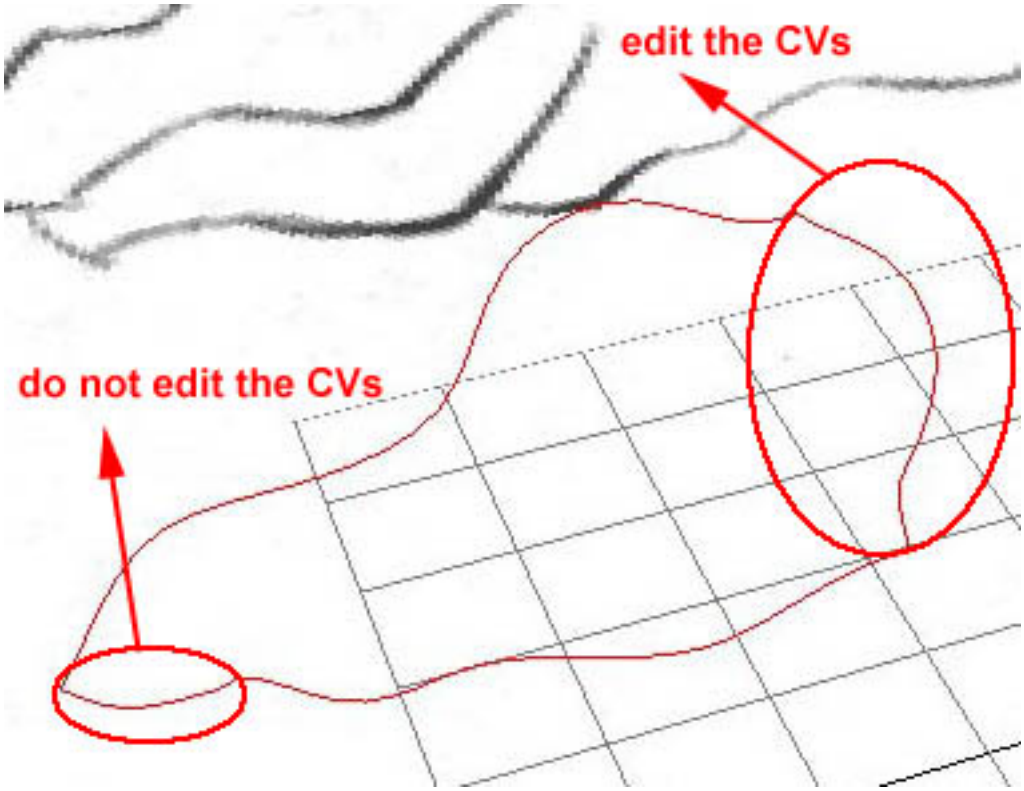
(Figure 4)

3.Now, I will rebuild the curve that I'd drawn to uniform number of spans. First is to ensure that uniform count of spans will form better surface. Secondly is to reduce spans count of surface, since I don't want to have so many points to push and pull around. Do not worry about the detail part, it can always been done by inserting isoparm to the surface. Press F3 to toggle to Modeling menu. Select curves that have been created. Go to Edit Curve, Rebuild Curve, options. Key in 10 for Number of Spans. Click Rebuild. Rebuild next curve too.

4.From Status Line select Snap to Curve. (Figure 5)

(Figure 5)

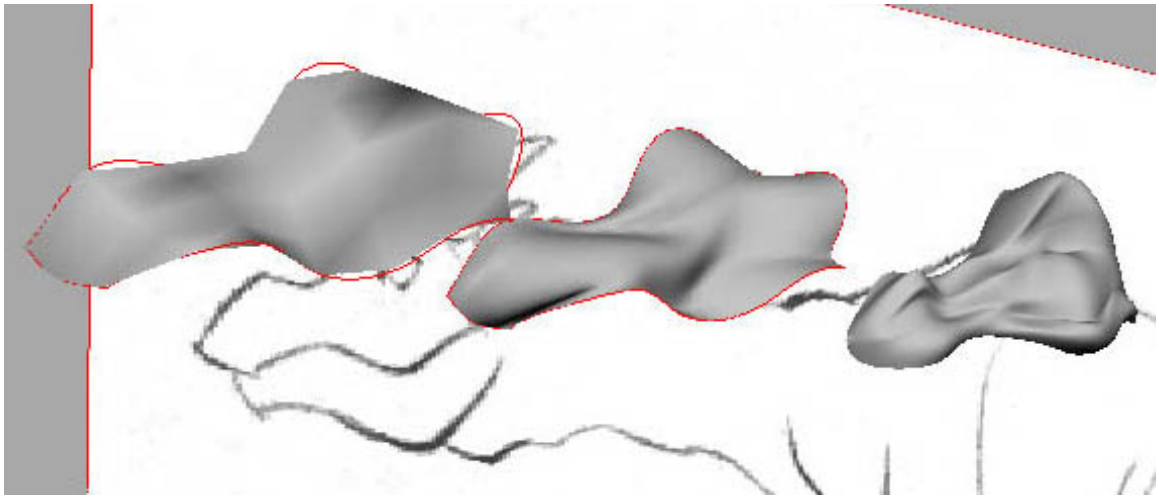
5. With the snap to curve activated, then select EP Curve Tool. Hold down LMB along first curve, you will notice that the first EP point is snapping on the curve. Snap the end point to second curve then press enter. Create another curve at both curve ends. I edit the last curve but leave third curve in the origin x-axis. Then I rebuild these 2 curves to 4 spans curve. (Figure 6)



(Figure 6)

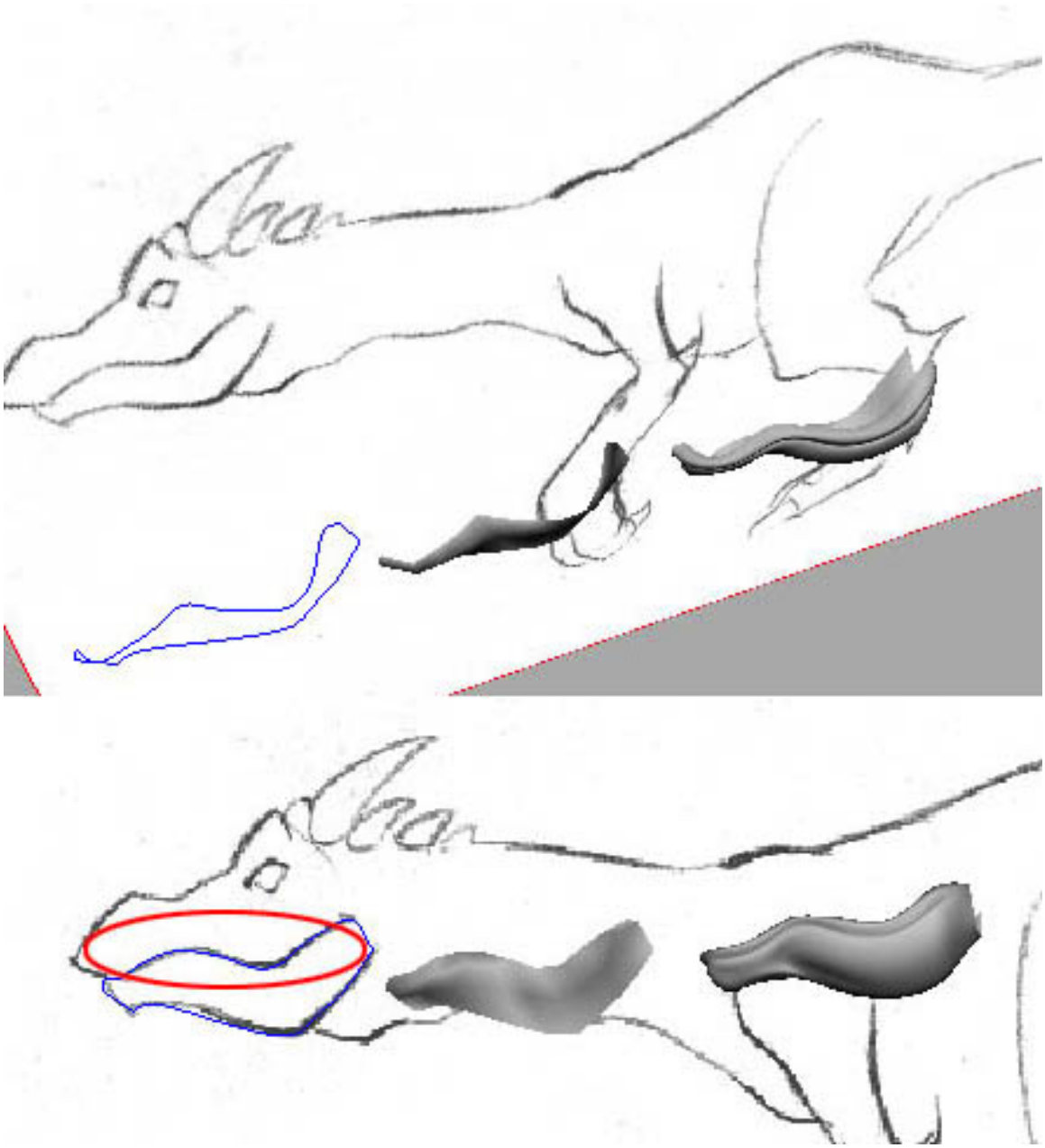
6.Turn off grid from Display, Grid. Now go to Surfaces, Birail-2 select 2 profile curves and then select 2 rail curves.

7.After surface is formed, press 5 to turn on smooth shade, then press 3 to display highest smoothness. Make sure you are in Components selection mode (Press F8 to switch), hold down RMB to select Hull, and again select Control Vertex from hot box. Keep pulling CV, using direction arrow to toggle point to point until you get something similar to the picture shown. (Figure 7) When I feel I need more CV to control certain part, just click on RMB, from the hotbox select isoparm. Click on any isoparm and drag it to the area that you would like to add in more detail, then go to Edit Surface, Insert Isoparm. After you have satisfy of what you have done, then select the surface, go to Edit, Delete by Type, History to delete construction history.



(Figure 7)

8. Now I will model the jaw using the same method as above to create 4 curves, but only curve marked in red will be edited (pull the CV along X-axis). (Figure 8)



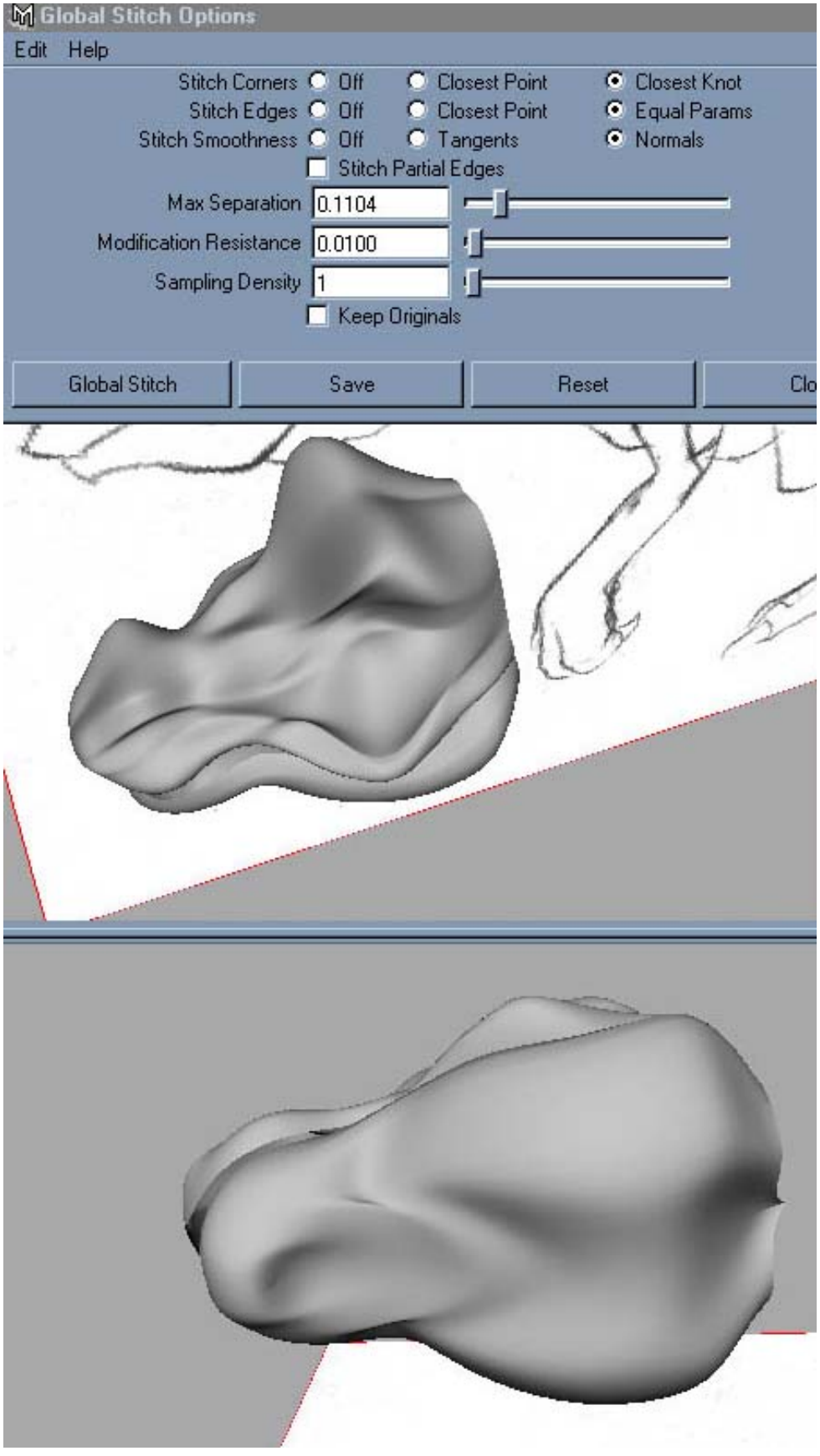
(Figure 8)

Rebuild curves, Birail-2 to form surface and then delete the history of the surface. Let's see what we have now. (Figure 9)

(Figure 9)

9. Select both head and jaw, go to Edit, Duplicate, options set the first Scale input field to -1, Number of Copies to 1, Geometry Type to Copy. Then press Duplicate button.

10. Now we will start stitching the surface to create seamless model. Select both head surfaces, go to Edit Surfaces, Stitch, Global Stitch, options. Set the following setting and press Global Stitch. (Figure 10)


Global Stitch Options
Edit Help
Stitch Corners Off Closest Point Closest Knot
Stitch Edges Off Closest Point Equal Params
Stitch Smoothness Off Tangents Normals
Stitch Partial Edges
Max Separation 0.1104
Modification Resistance 0.0100
Sampling Density 1
Keep Originals
Global Stitch
Save
Reset

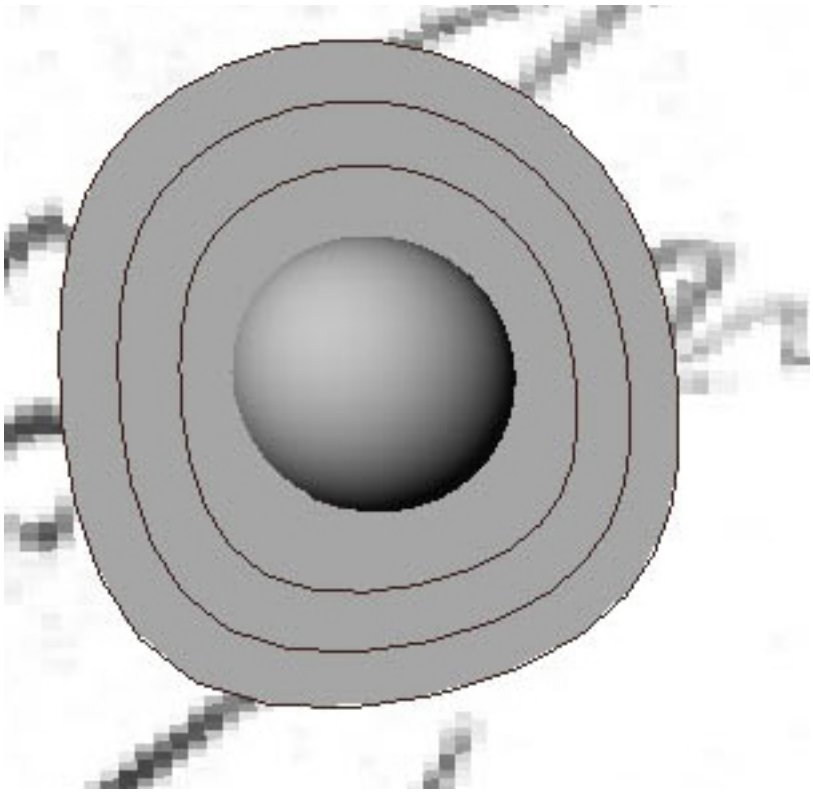
(Figure 10)

If there are gab between surfaces, just play around with difference Max Separation value. The jaw surface was stitched with same method. With Global Stitch, there is no need to select both surfaces isoparm and stitch edges. It help to save time when you have a lot of surfaces to stitch!

Creating an Eye

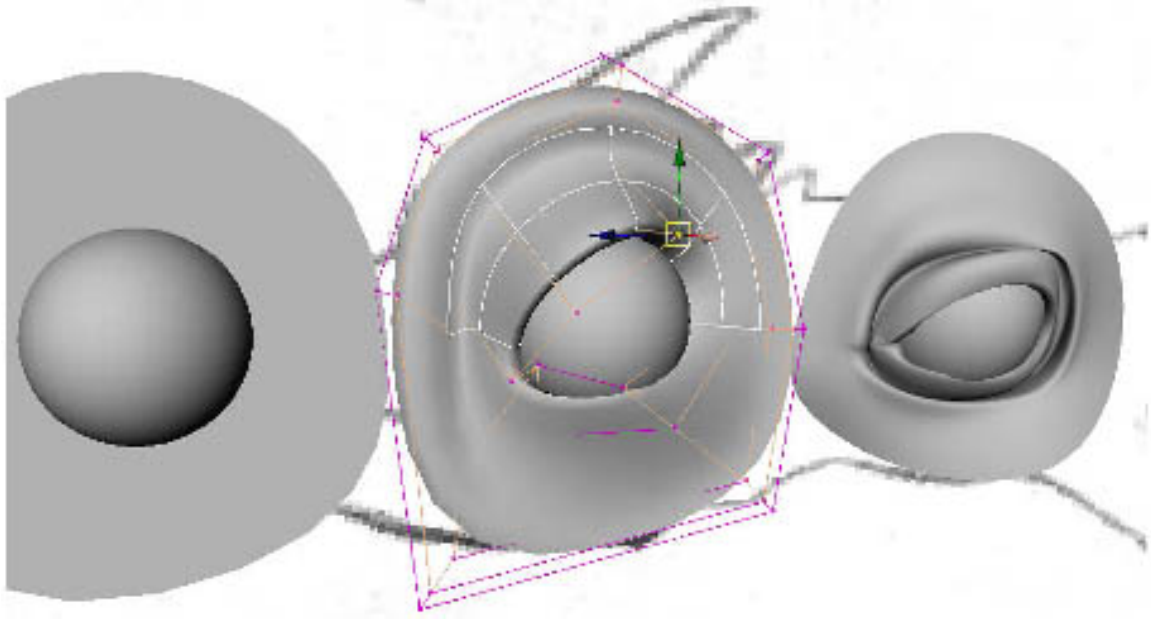
11.We shall now create an eye for the dragon. Before we start, select all the surfaces, then go to Display, Hide, Hide Selection. First, I created a NURBS sphere, then translate and scale it to the position of an eyeball. When it's done, select the sphere and hold down RMB to invoke hotbox then go to Actions, Template the eyeball.

12.Next use EP Curve Tool to draw a curve. Snap the start point to end point to create a circle. After that, go to Edit Curves, Open/Close Curves to close the curve. From there duplicate another 4 curves and scale them to 4 difference sizes. Before you scale, go to Modify, Center Pivot. This will put pivot point of the circle to the centre. After this is done, select the curves in order, then perform Loft from Surfaces menu. Press 3 for hi-res display, then delete construction history of the Lofted surface. And also don't forget to delete the 4 curves that we use to create surface. (Figure 11)



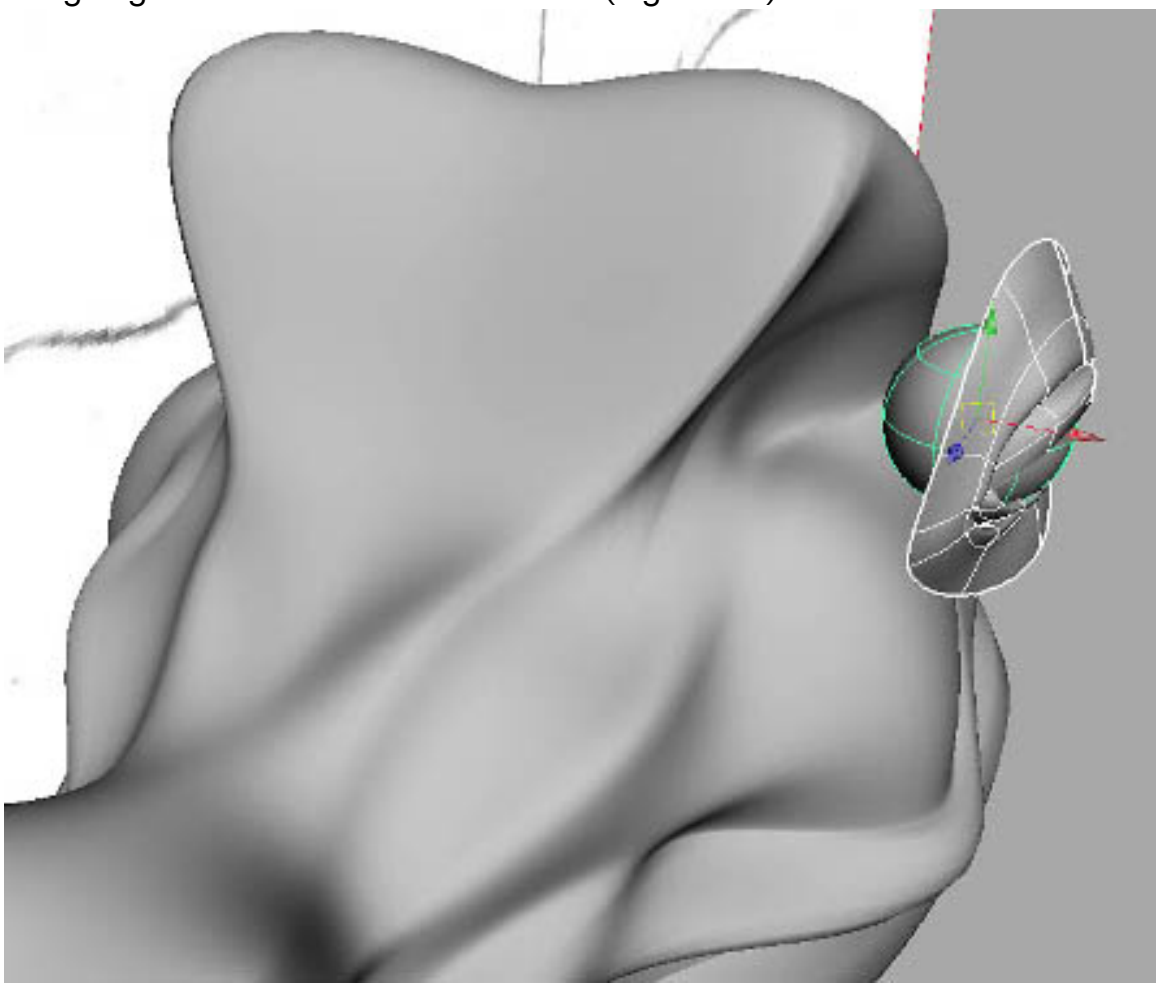
(Figure 11)

13.Hold down RMB to select Hull, then select again Control Vertex from hotbox. Keep on pulling CV, using key pad's direction arrow to toggle from point to point until you get something similar like picture shown (Figure 12). Make sure the eyelid fit properly to the eyeball.



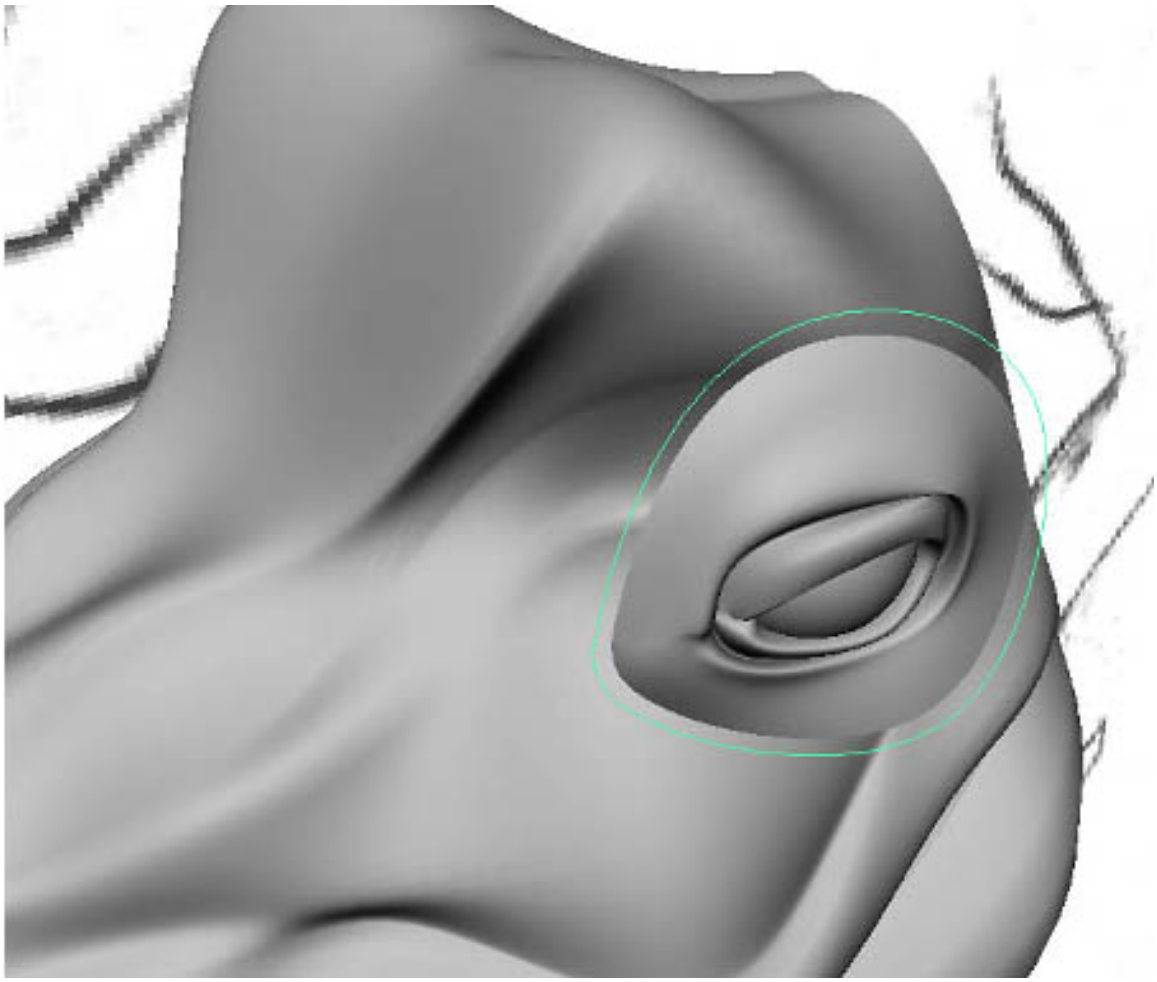
(Figure 12)

14.Then group them together and translate it above the head model. We are going make a hole out of its head! (Figure 13)



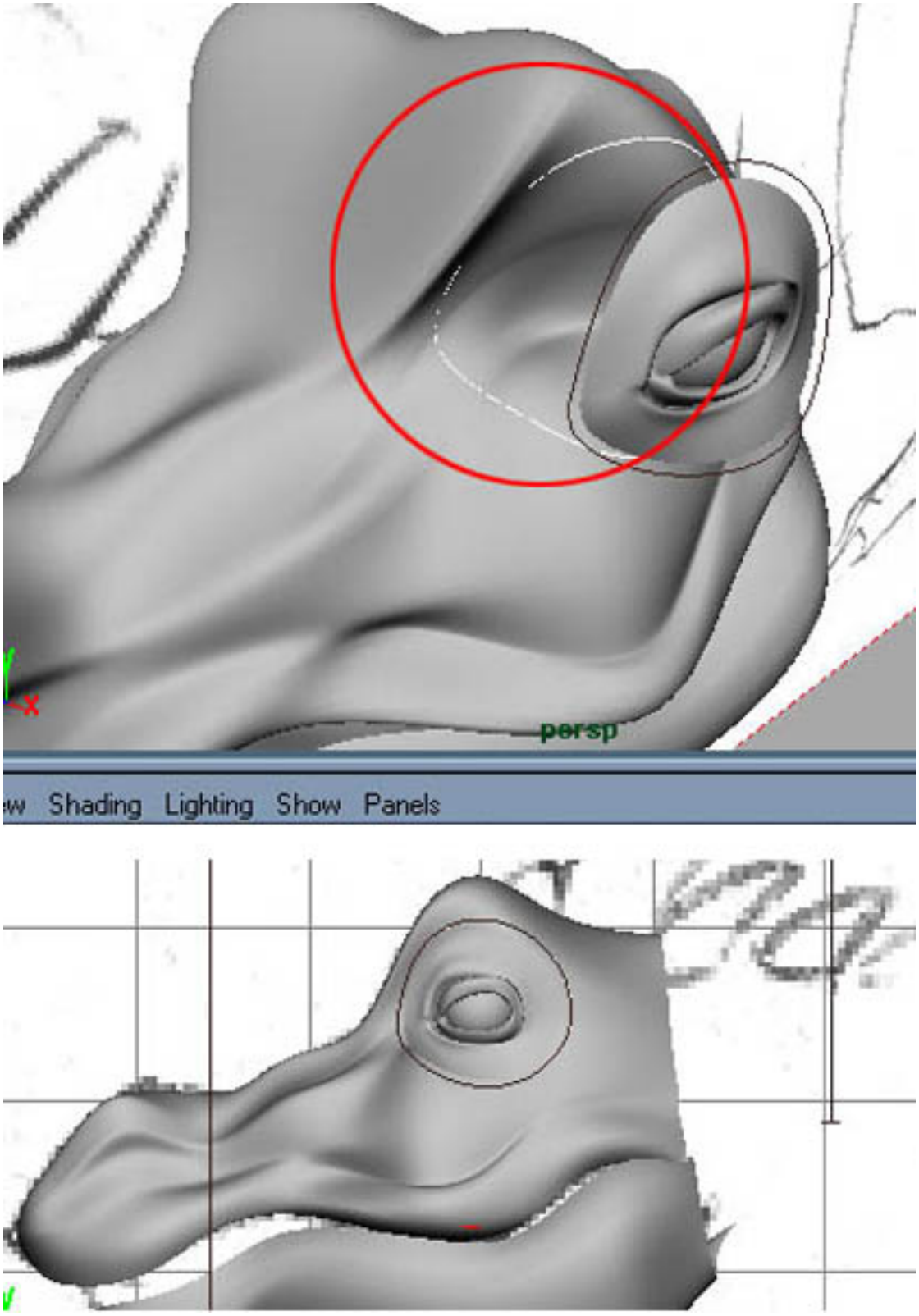
(Figure 13)

15.Select the eyelid, RMB to select the edge isoparm. Go to Edit Curves, Duplicate Surface Curves. This will create a curve circle base on the isoparm that you selected. Then go to Modify, Center Pivot. Finally scale it slightly bigger then the eyelid's surface. (Figure 14)



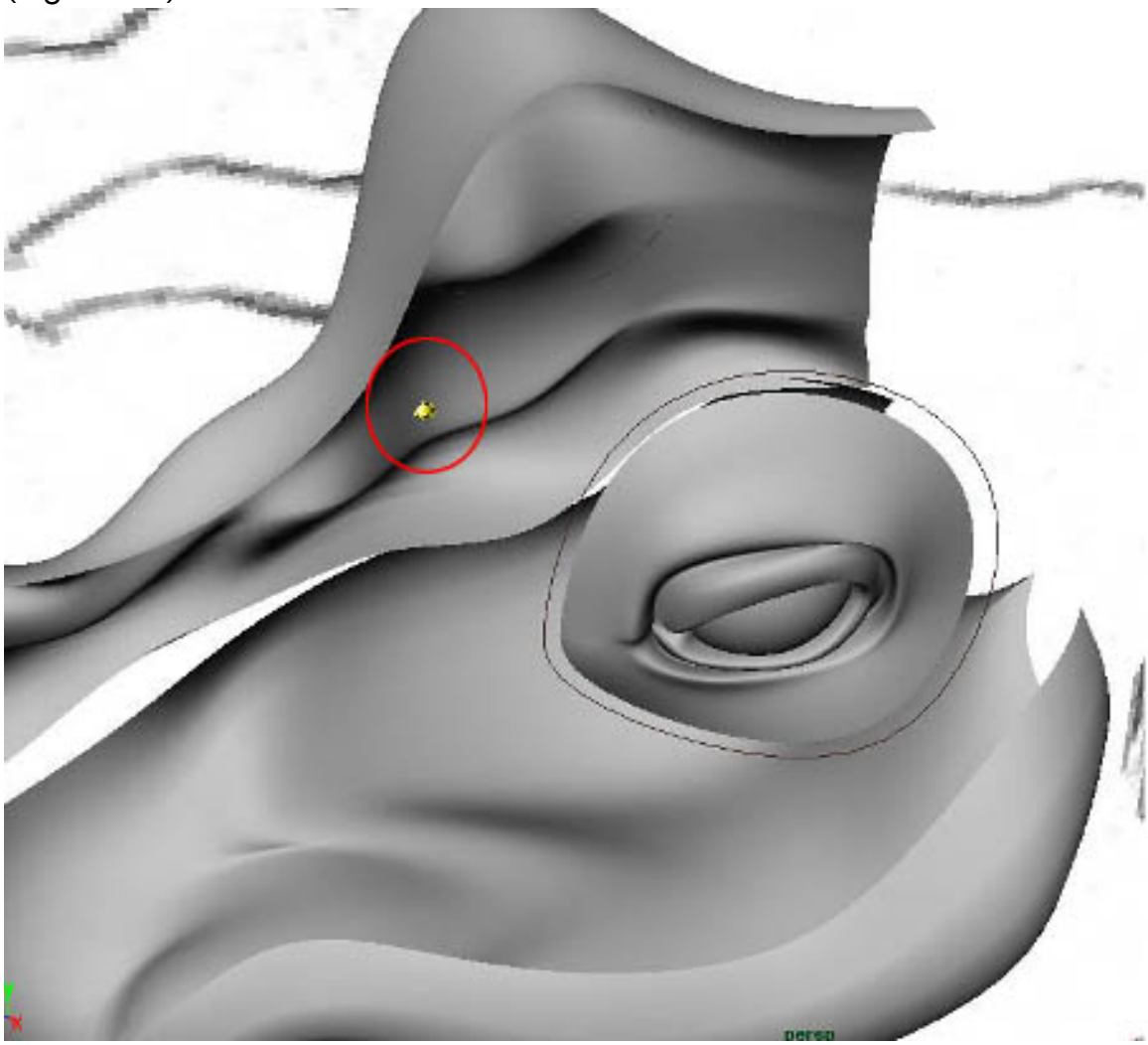
(Figure 14)

16.We will project this curve on to the head. Select both head surfaces and curve, switch to side orthographic view. Go to Edit Surfaces, Project Curve On Surface, Options. Project Along Active View should be selected. Then click on Project button. This will project the curve on to the surfaces base on the active view; in this case I want it to project from side orthographic so that it will project a similar circle on both head surface. If it's project from perspective view, you will get a strange and awkward result of curve on surface. Now, let's take a look at figure 15, the one that I have circle in red was to show the curve that projected on the head surfaces. (Figure 15)



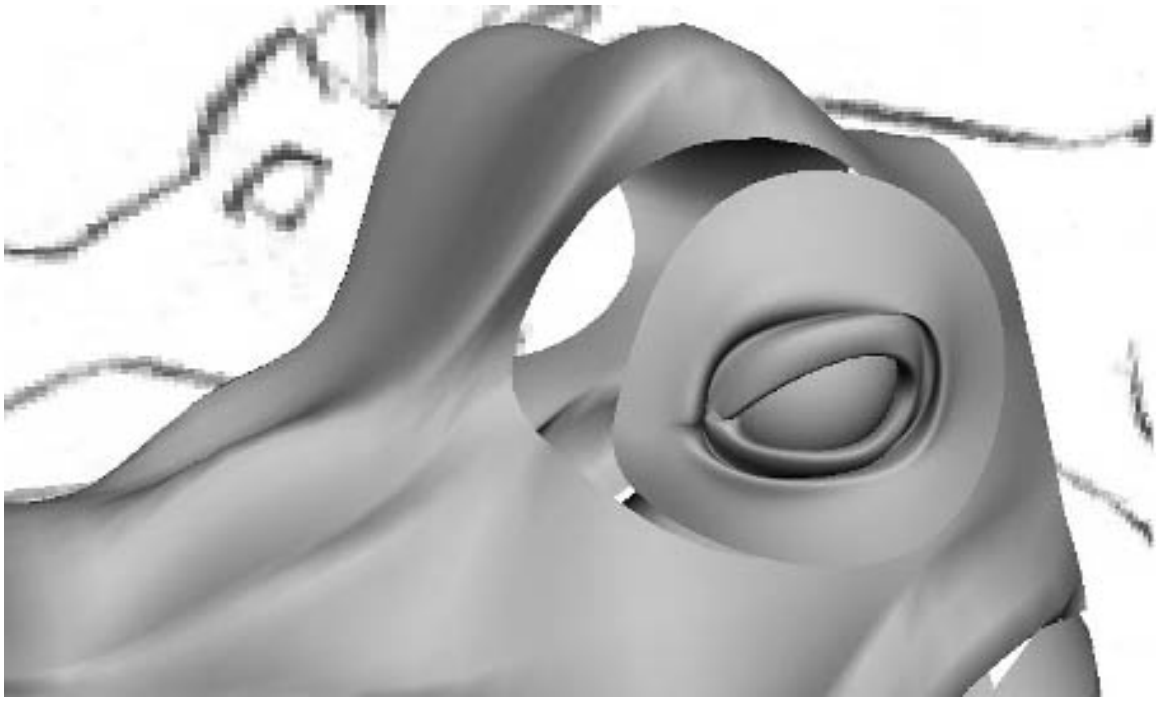
(Figure 15)

17.Select the surface then go to Edit Surfaces, Trim tool. The surface should have transform into white wireframe (not show in Figure 16). (Figure 16)



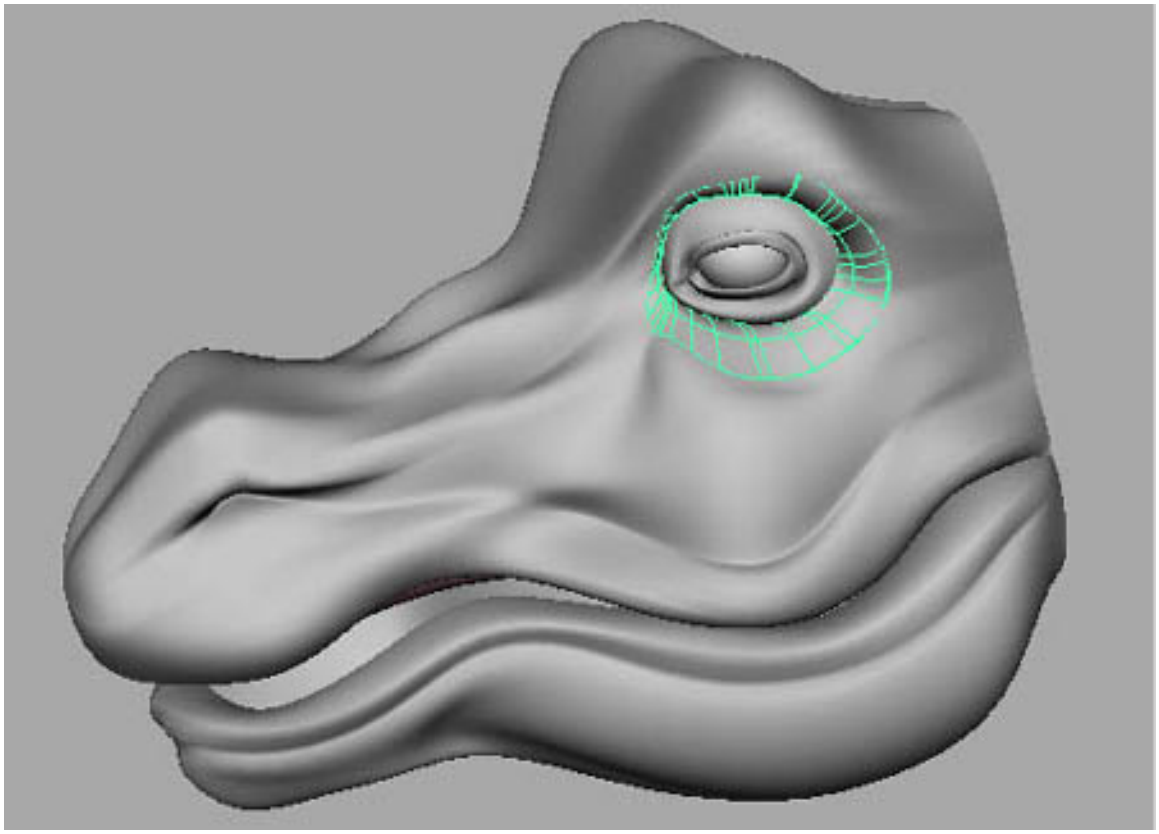
(Figure 16)

Click on the surface that we want to retain, a yellow dot will appear when clicked then press Enter to confirm the trim. Press 3 for hi-res display. Repeat the same procedure for the other side of the head surface. (Figure 17) Delete curves that use for projection when done.



(Figure 17)

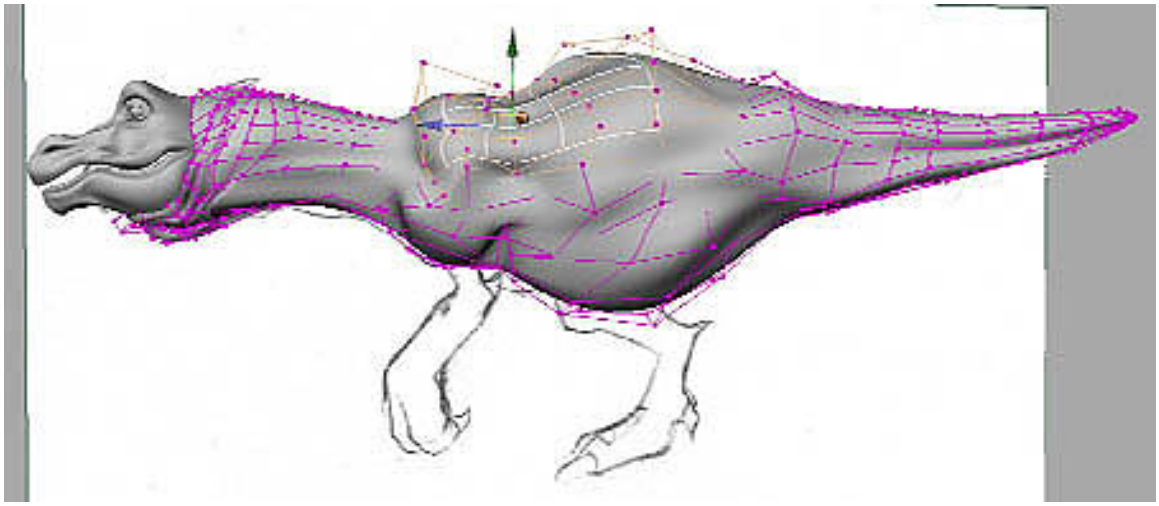
18.I will create a fillet blend between the gab. Select isoparm of eyelid edge, and then shift select Trim Edge of head surface with RMB. While both edges were selected, go to Edit Surfaces, Surface Fillet, Freeform Fillet. Press 3 for hi-res display. With construction history you can adjust the eyelid's edge and the fillet surface will follow. Once you are satisfy with the result, select the surface blend and delete the construction history. (Figure 18)



(Figure 18)

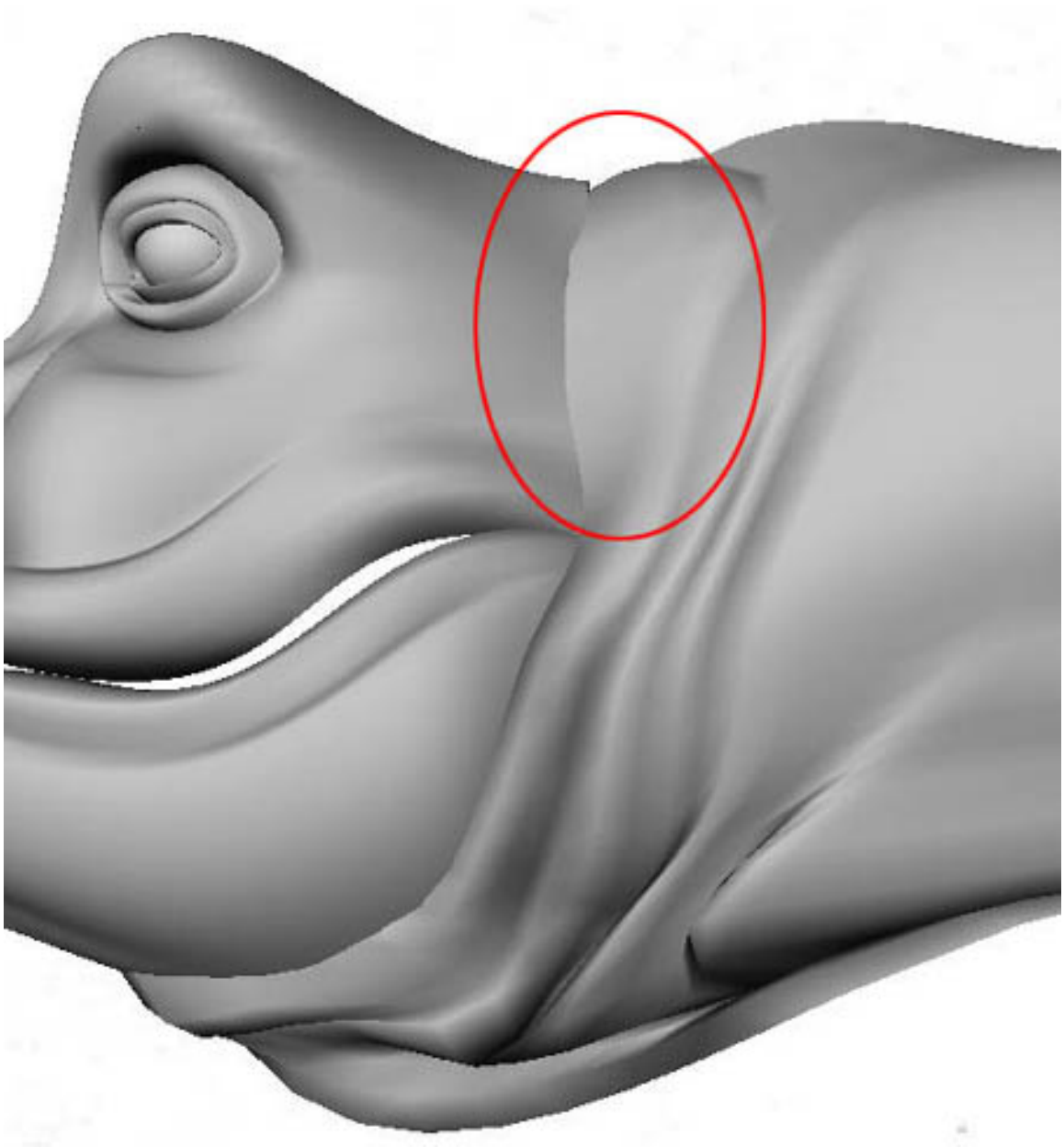
Modeling Torso

19.Model the torso is easy, use the same method as I use to model the head. First I use EP Curve Tool to create 4 curves on side orthographic. Each curve must intersect with one another. Then I rebuild curves to the amount of span I want. Always remember to keep less number of spans. You can always insert isoparm when more detail is needed. I inserted some isoparm in the area where the neck meet head, so as to create wrinkle below the neck. (Figure 19)



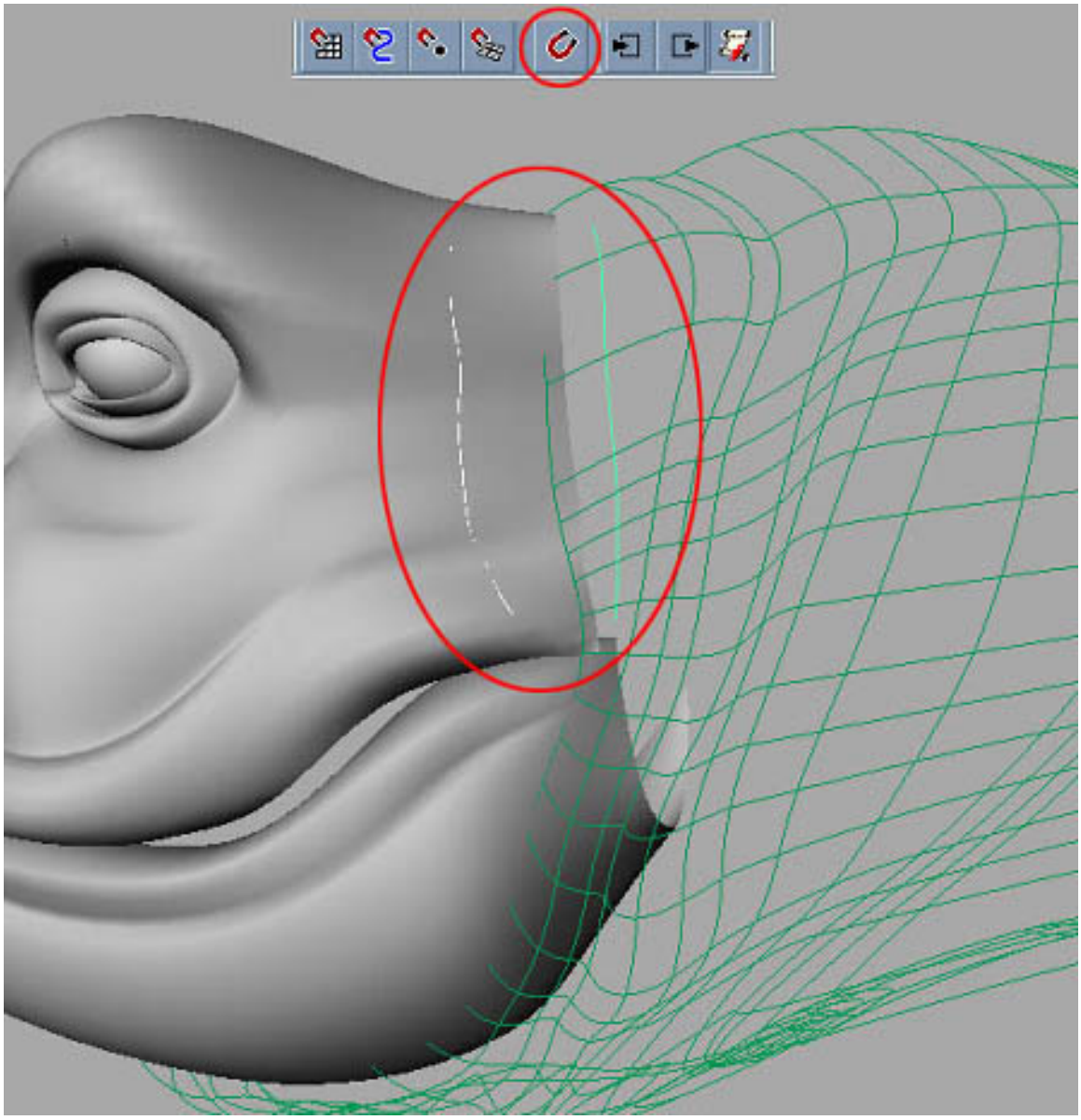
(Figure 19)

20.We can see there are an obvious seam where head joins the neck. (Figure 20) Don’t worry about the clear-cut of the seam, we will fix this with texture transparency later when texture maps the dragon.



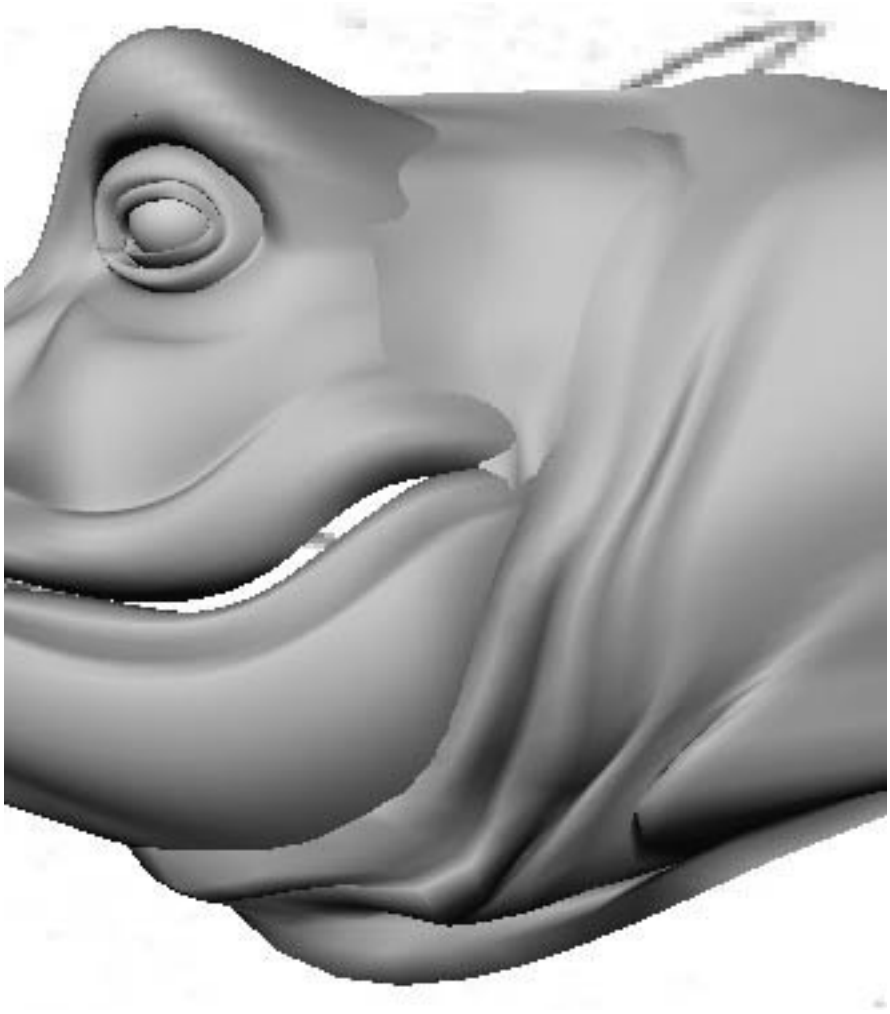
(Figure 20)

21.To use Texture transparency to blend in 2 surfaces, we need to create another surface. We will using Loft to create 3 spans surfaces. Firstly select head model, then click on Make Live icon, notice that the surface turn into green wireframe. Select EP Curve Tool and draw a curve on the surface. Next Make Live the neck surface and draw curve on it. (Figure 21)



(Figure 21)

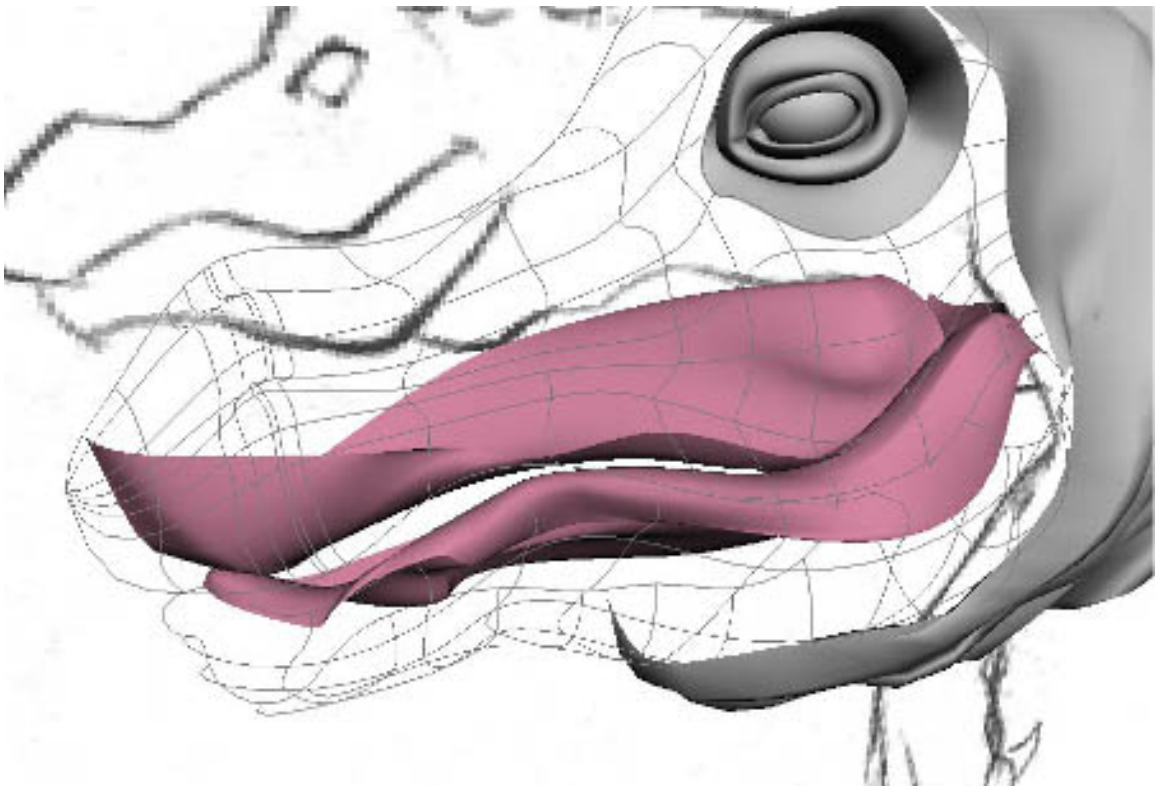
Duplicate one of the curves by using Duplicate Surface Curves then place it in between curves. Select curves in order, then perform Loft to create surface. (Figure 22)



(Figure 22)

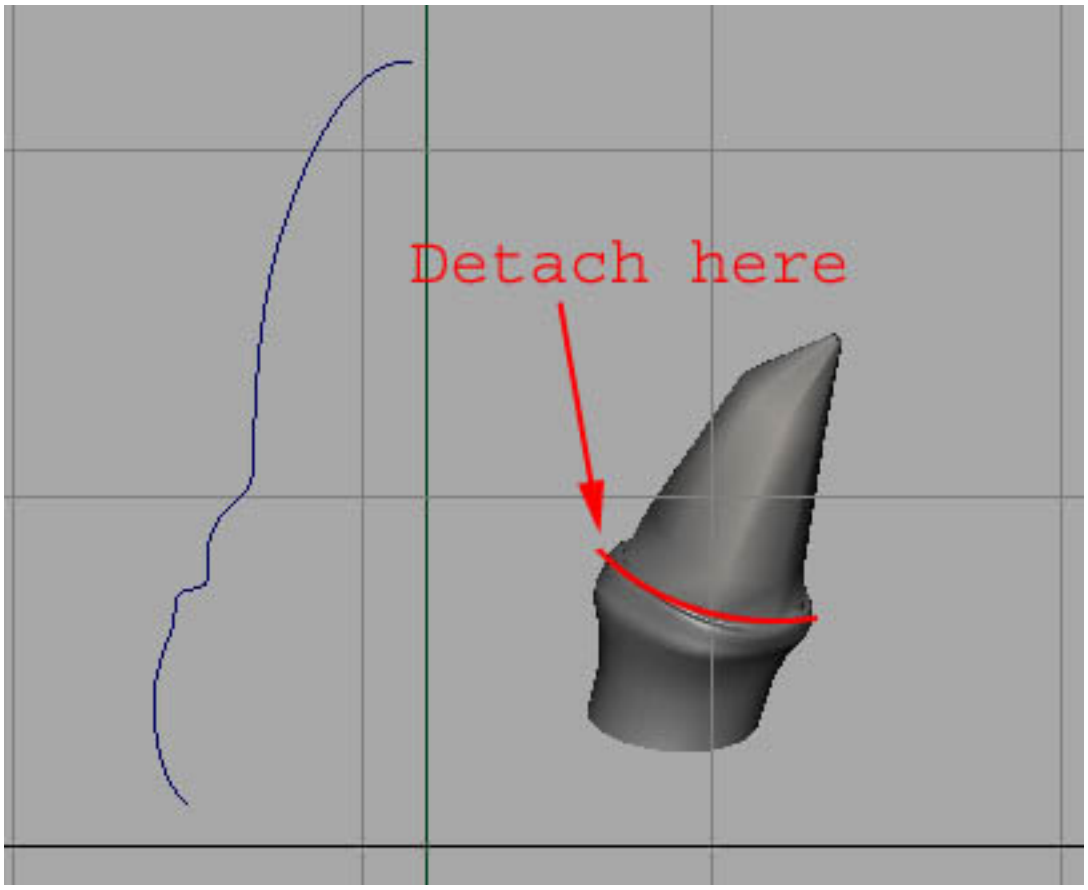
Modeling Gum and Teeth

22.The gum is model from a NURBS plane. Before we start, template the head and jaw. Select torso and go to Display, Hide, Hide Selection. Go to Create, NURBS Primitives, Plane, Options. Set the patches U and V to 3 then translate to head position and start to manipulate the CV to form a gum shape. (Figure 23) After that mirror it and stitch it together.



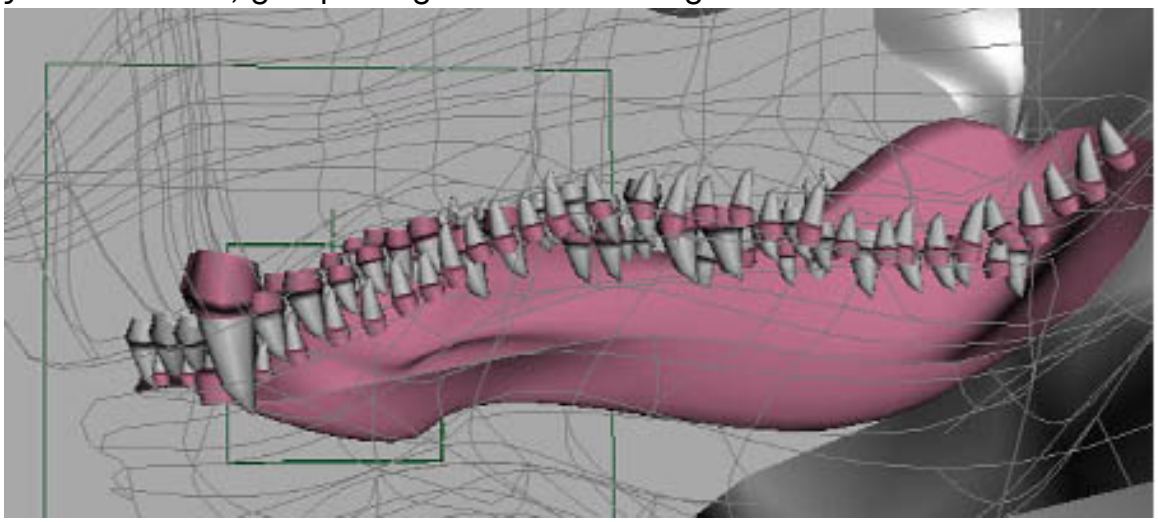
(Figure 23)

23.Tooth is model with revolve technique. Turn on grid; Switch to side orthographic view. Draw a curve on axis origin. Then go to Surfaces, Revolve. (Figure 24) For future texturing, we will detach the model. The top part will be tooth and bottom part will be gum. Select isoparm and go Edit Surfaces, Detach Surface. Then group them together.

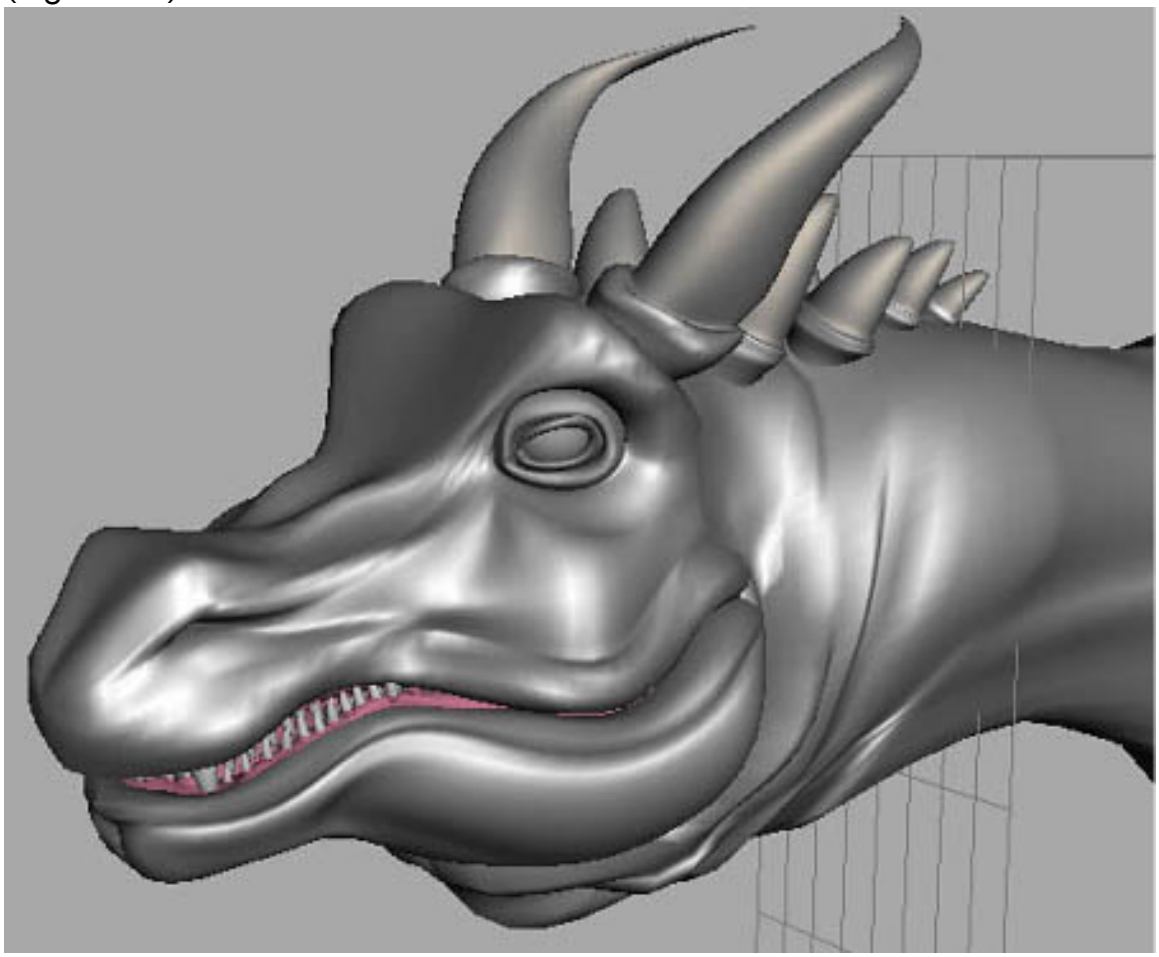


(Figure 24)

24.Use the tooth we just model, duplicate, rotate and scale it to difference sizes. Place them to upper and lower gums. (Figure 25) When you have done, group the gum and teeth together.


(Figure 25)

25.Now duplicate the tooth again and scale them to a larger size, pull the CVs to make them into horn like shape and place them on the head as horns. Copy a few more and mirror it to something similar as Figure 26. (Figure 26)

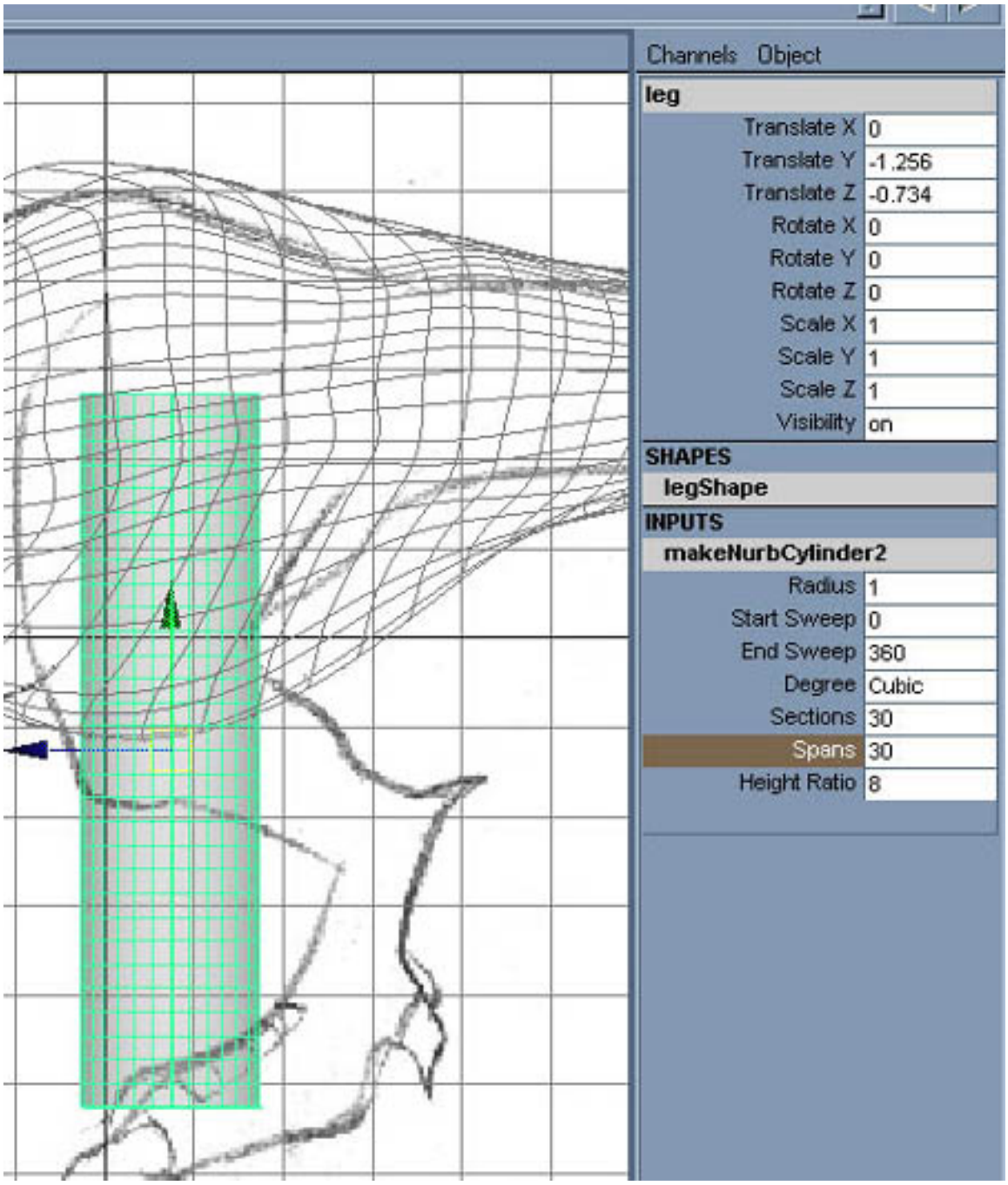


(Figure 26)

At last the head of the dragon was completed. Next we will build the dragon's leg.

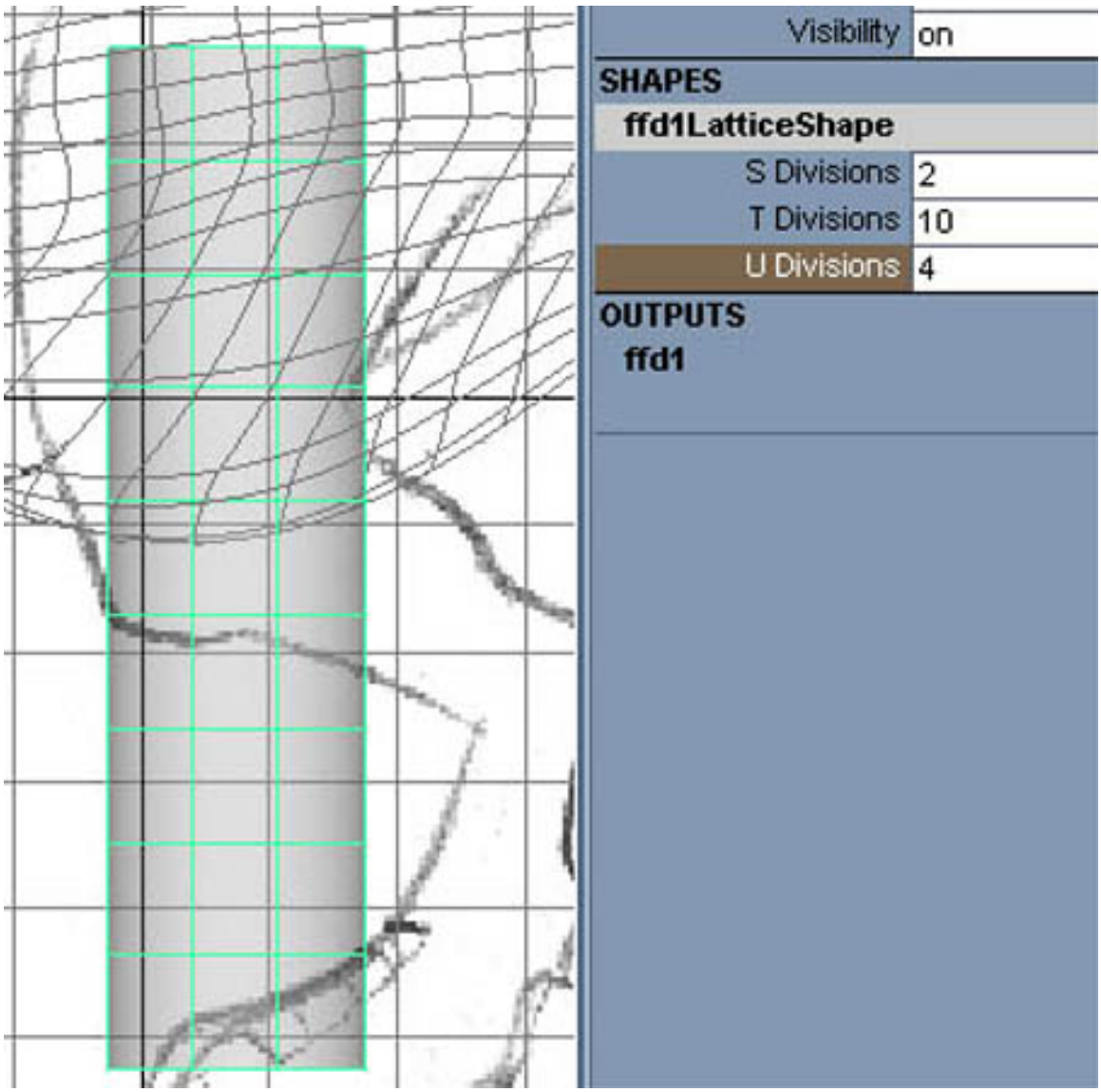
Modeling Legs

26.The leg is created from a cylinder. First, we create a NURBS cylinder, from Channels box, click on Sections, hold down MMB and drag. Note that the number in input field is changing. We will change the number of Sections and Spans to 30. When it is done, translate it to the position we want. (Figure 27)



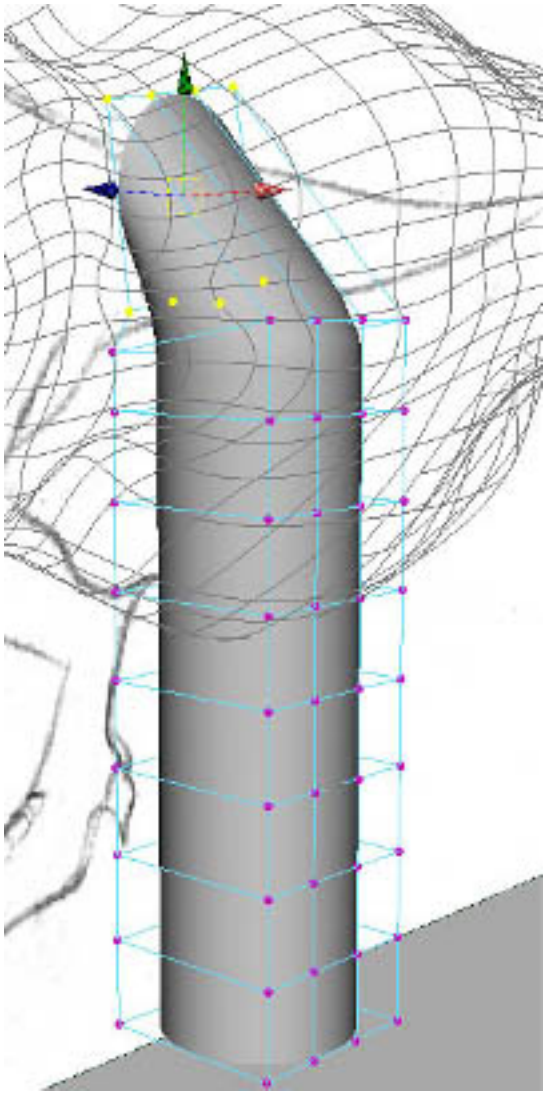
(Figure 27)

27. We will deform the cylinder into the shape of leg. Before that, select the cylinder, press F2 to switch to Animation, go to Deform, Create Lattice. An outline box which surrounds the cylinder will appear. From Channels box change the S Divisions to 2, T Divisions to 10, U Divisions to 4. (Figure 28)



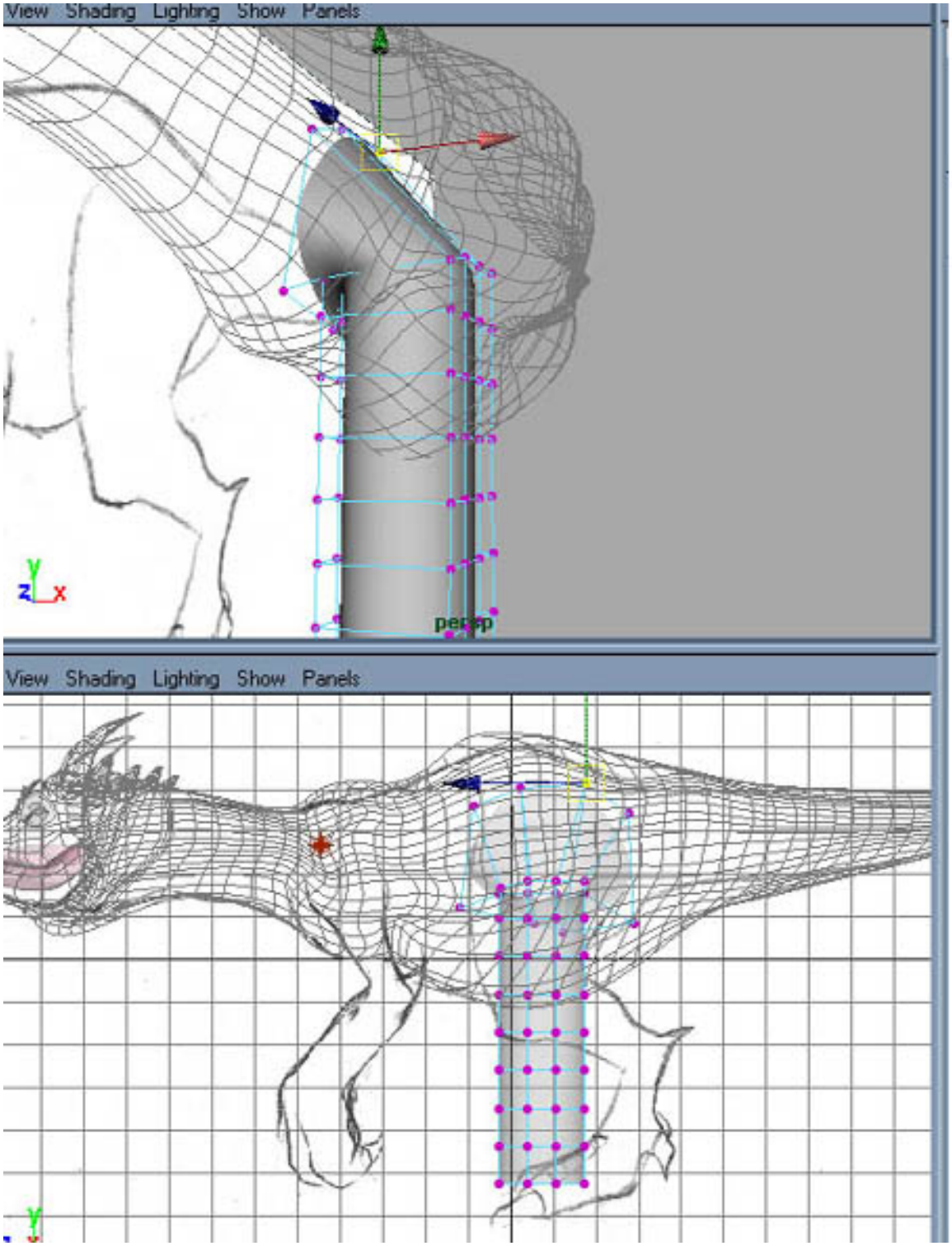
(Figure 28)

28.Select the box that surrounds the cylinder, hold down RMB and select Lattice Point from hotbox. Press w to activate move tool, select the first row of lattice points and tilt it into a position as figure 29 shown. (Figure 29)



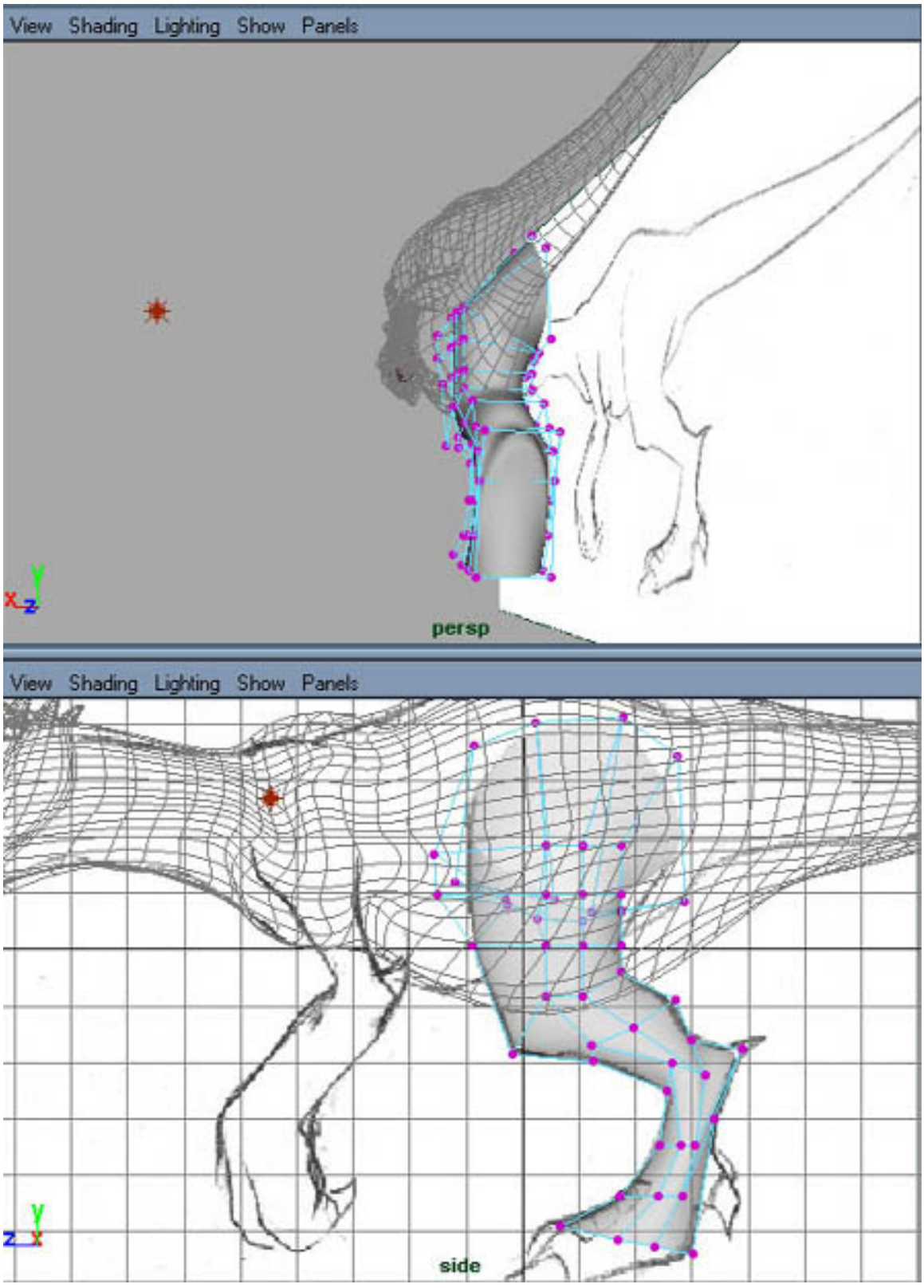
(Figure 29)

29. This part will be fillet blend with torso in the future. Switch to side view, from Shading, Shade Option, x-ray. This will make the cylinder become translucent so we can pull points by referring to Image Plane. (Figure 30)



(Figure 30)

30.Continue to pull, push, scale and rotate lattice points until it form into a leg shape. When you are satisfied with it, select the cylinder and delete the construction history to confirm the shape. (Figure 31)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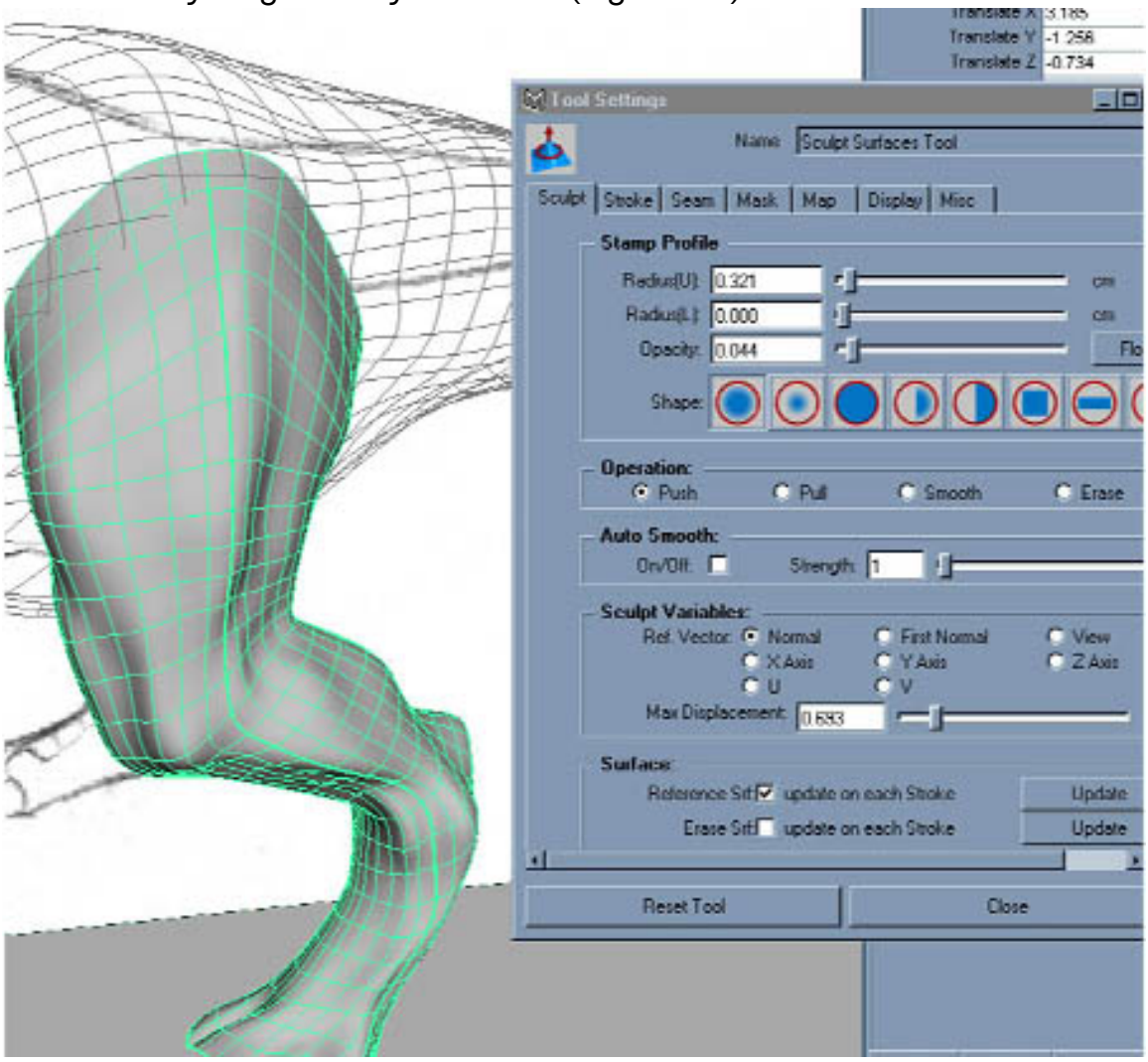
side

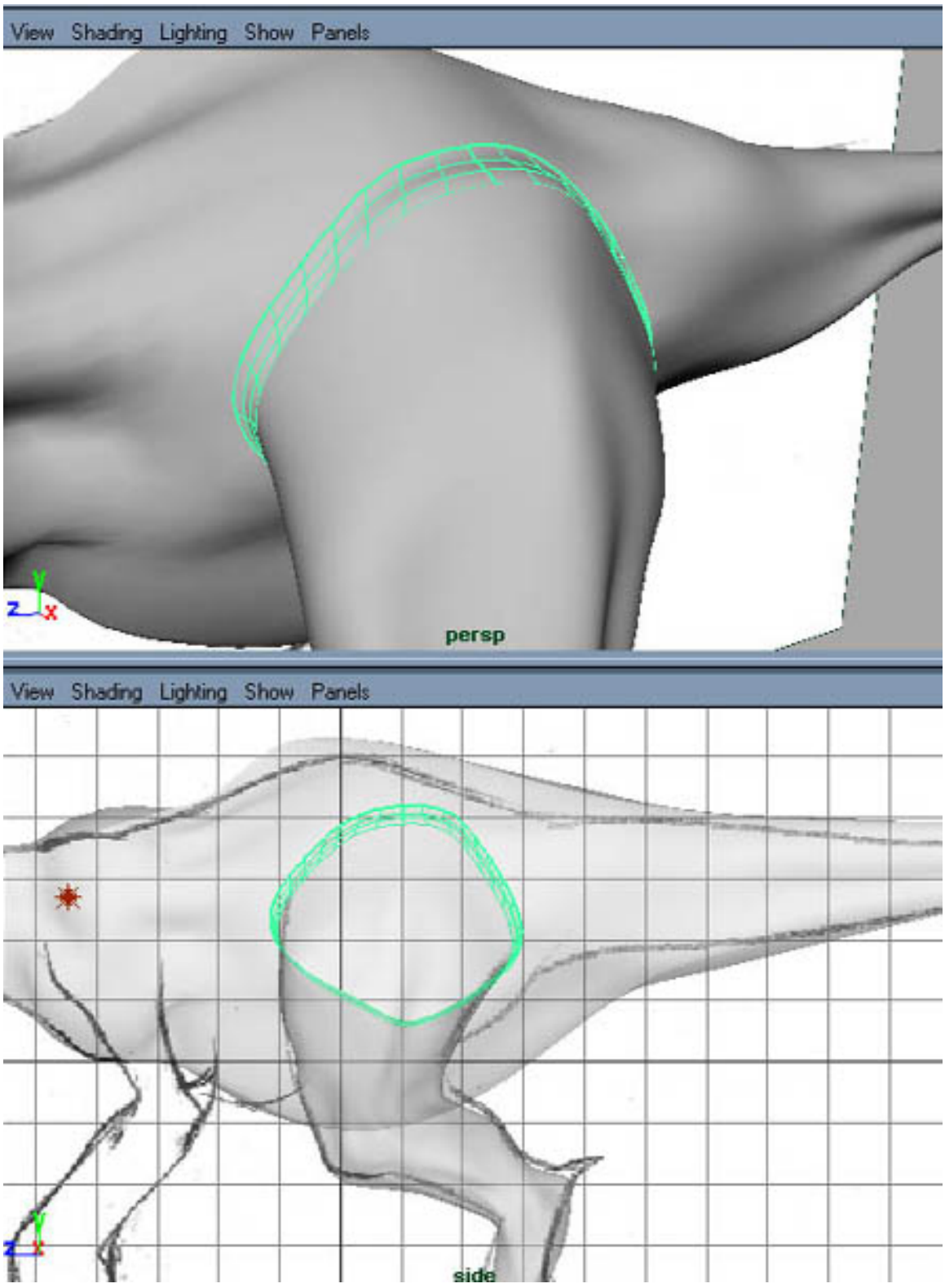
(Figure 31)

31.Next, we will use Maya Artisan to sculpt the detail of the leg. Make sure the leg is selected, go to Edit Surfaces, Sculpt Surface Tool. Hold down b key and MMB to adjust the brush radius, m key and MMB to adjust the max displacement and start sculpting the surface. Keep your finger near to z key to get ready for undo. (Figure 32)



(Figure 32)

32.When it is done use the same method of creating fillet blend for the eyes to create fillet blend for the leg and torso. (Figure 33)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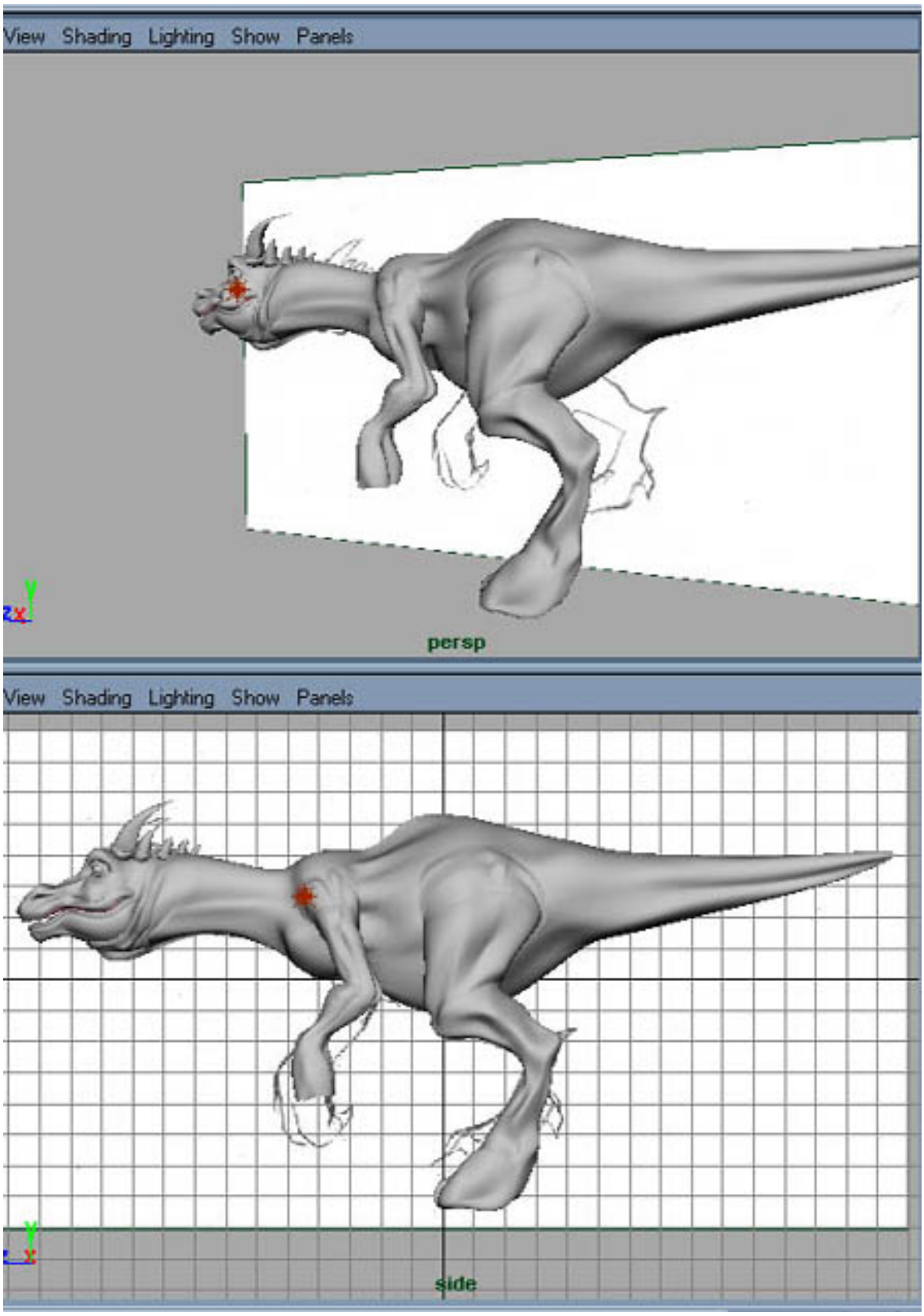
persp
View Shading Lighting Show Panels
side
(Figure 33)

33.We will use the same method to create fore limb for the dragon. (Figure 34)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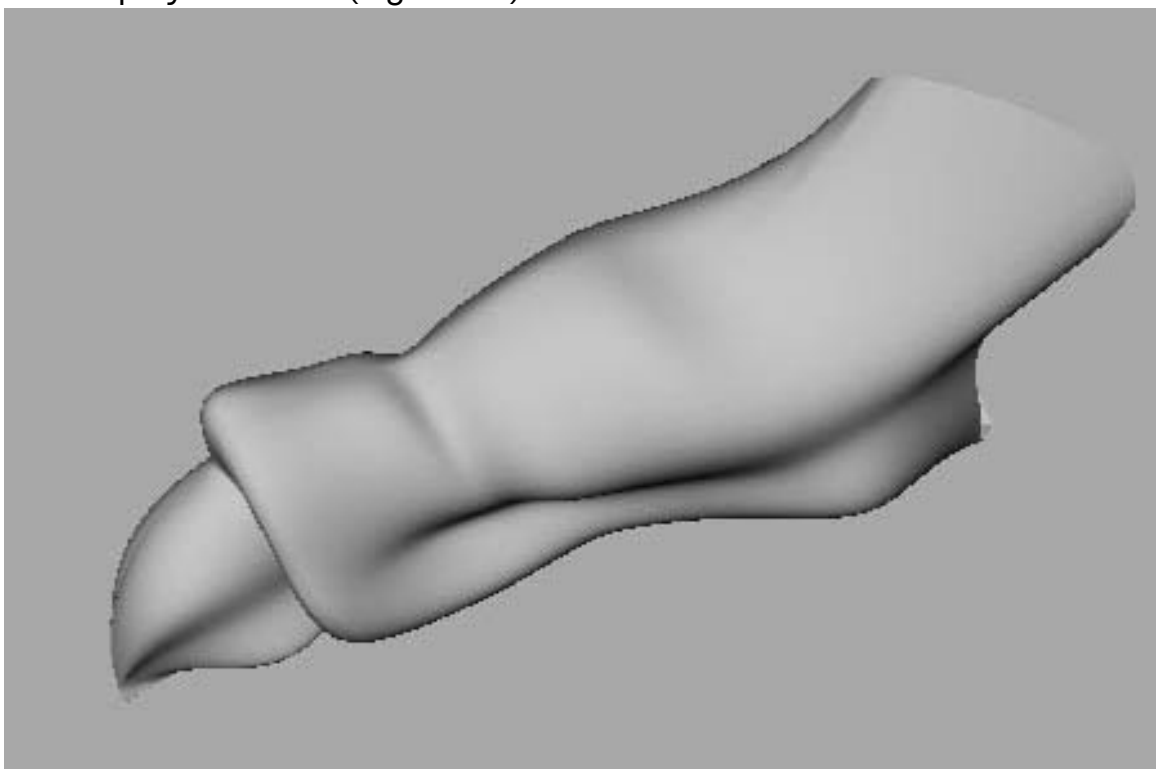
View Shading Lighting Show Panels
side

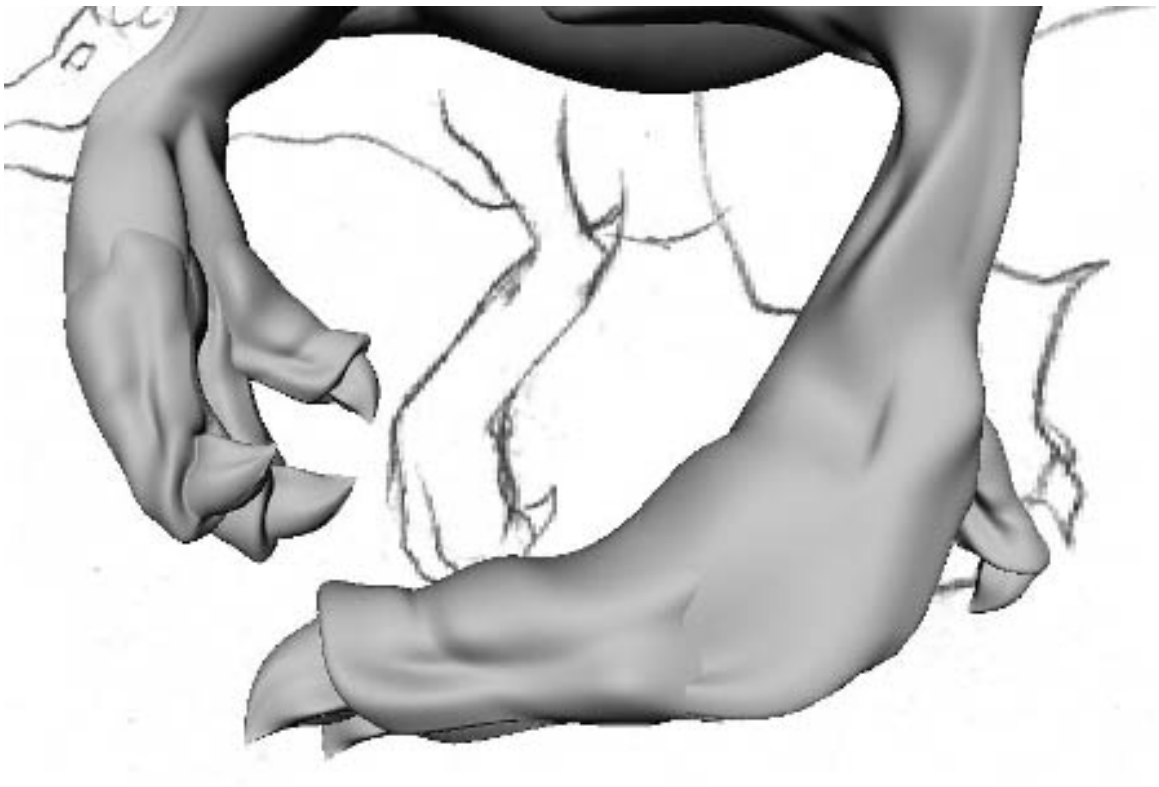
(Figure 34)

34.Well, we still need toes and fingers to complete the dragon. The toe can be done by using the same technique as horn and teeth, which is revolving from curve. You can use CV pulling or Artisan to sculpt it into the shape you wants. (Figure 35)



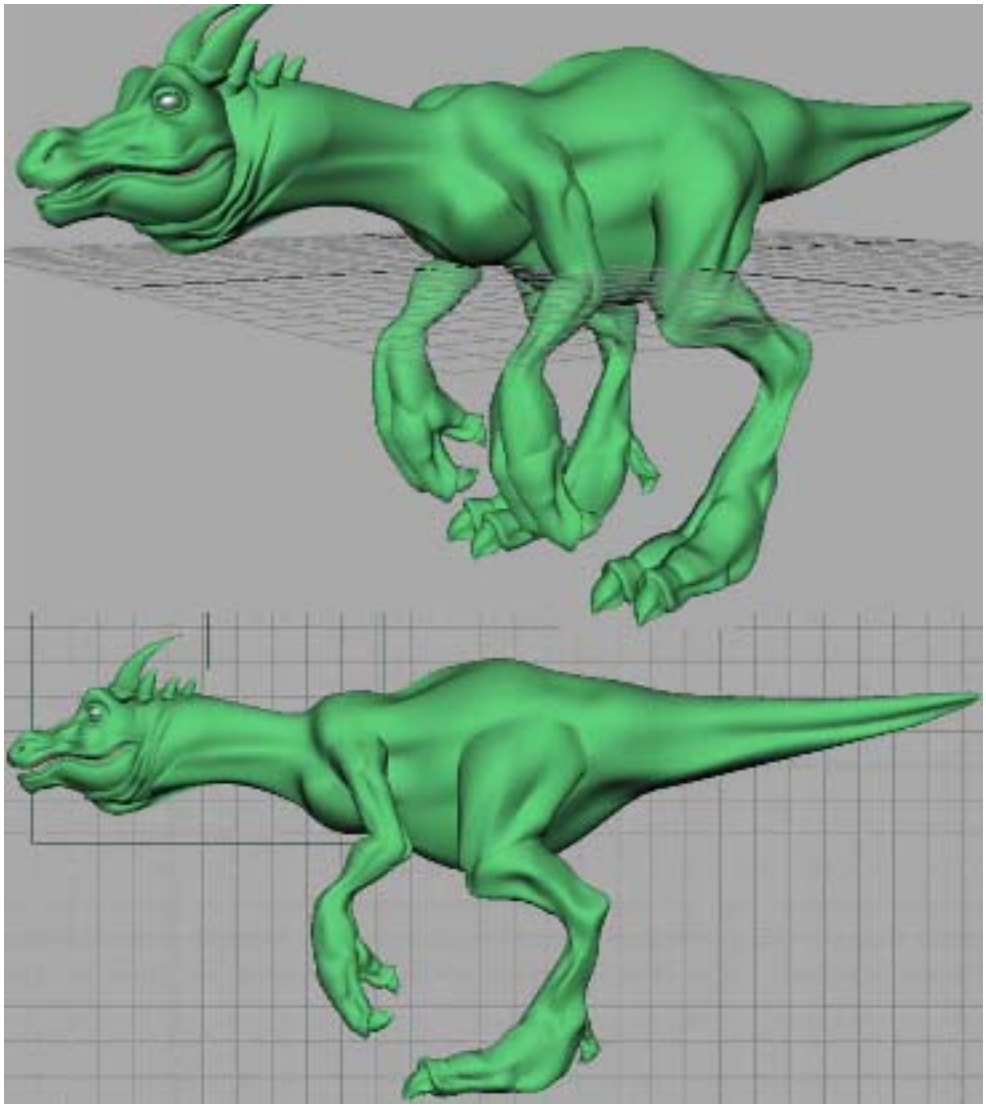
(Figure 35)

35.Basically, the fingers are just the same model as toe. From the first toe I had made, I duplicate it, scale it, rotate it and pull the CVs into the shape of finger and place them on to their positions. Instead of fillet blend so many fingers and toes, I decided to use texture transparency to blend the surface. This will help to save up a lot of time. So what I do is to make sure the fingers is intersect properly on to the palm. (Figure 36)



(Figure 36)

36.Finally, we have completed the entire model. We can now mirror it to form a complete dragon. Do you still remember in the early part, we had mirrored the head and jaw of dragon and stitched them together. We will now apply the same technique to the body. Group all the part you want to mirror and name it as body. Go to Window, Hypergraph to call up hypergraph window. Select the body group from hypergraph and mirror it to form a complete model. The modeling of the dragon is thus completed. (Figure 37)



(Figure 37)